THE

ELECTRICAL REVIEW.

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ELECTRICAL REVIEW.

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THE BRITISH TRADE OUTLOOK IN CANADA.

READERS of the ELECTRICAL REVIEW will agree that it is not through any lack of attention to the matter in these pages that Canada has not been a larger buyer of British-made electrical goods. The reasons for making an effort to meet the special requirements of the market; the classes of manufactures which stood a better chance than others of succeeding; the influence of the Chicago Underwriters on the situation, and the means for meeting this difficulty; suggestions for establishing a branch of the B.E.A.M.A. over there; the vastness of the territory to be covered; and the best means of organisation for selling British-made goods in competition with U.S. goods coming over-night from over the border—all of these and many other points have been amply covered—some have thought *too* amply covered because their own experience had not seemed to justify serious attention being given to the subject.

We confess that sometimes we have despaired of much good being done after so many efforts had been made and had failed. But we are at heart optimists, because we believe blood to be thicker than water and than American influence, and because we believe that thousands of Canadians would far rather use an electrical article emanating from the British Isles than one coming from South of the border line.

Not only are these patriotic sentiments stronger, for obvious reasons, than they were before the war, but Canada is far more industrial than she used to be, thus furnishing new business opportunities, although also adding to her own internal productive capacity. It has always seemed that lack of efficient selling organisation on our part has been a failing which prevented British trade expansion there, and schemes promising enough at the time have proved to be born out of due season. But it need not follow that to-day, when the new U.S. Tariff is creating an atmosphere favourable to our operations and when Canadian sentiment is so strongly British, a new well-thought-out plan along somewhat different lines should not stand a better chance. We give some brief particulars of such a scheme in our "Business Notices" this week, and our readers will be able to form their own judgment concerning it.

Simultaneously with the launching of this new enterprise for the distribution, and in some cases production, of British electrical manufactures, there is being placed before the readers of a financial contemporary a defence of British companies and firms against repeated charges of lack of interest in the Canadian market. We are more concerned with the question of electrical and allied goods than with general manufactures, and probably the case which is taken in hand by the Federation of British Industries may be less electrical than general because of the constitution of the F.B.I., notwithstanding the relation of the B.E.A.M.A. to that organisation. We may, however, record the findings of the F.B.I., which have been arrived at after full consideration. First, the close proximity of the United States must always be reckoned as an important adverse factor; on that point the Federation considers comment to be unnecessary—the advantage to Canada is obvious provided she can get the article that she requires and the pro-British sentiment is outweighed by immediate con-

siderations. Secondly, the rapid development of manufacturing in the Dominion itself, already mentioned above, is a policy much favoured in recent years not only by Canada, but by Australia, and India too, though it has not been carried very far in connection with the electrical industry. Until we can know how far the movement will go and whether it will or will not be permanent, British development along the same line is quite naturally restrained. Canada with her hydro-electric resources, and Australia with the prospect of very cheap power under the Morwell brown coal scheme, are both anxious to induce our manufacturers to start works in the cheap power areas, but our firms will have to consider the matter from many points of view.

But what calls for the fullest defence from the F.B.I. is the charge of failure on the part of British firms to study the Canadian market thoroughly and to adapt themselves to its needs. The Federation describes this criticism as unjust, and it is so large and so representative an organisation that it ought to be in a position to speak authoritatively. Indeed, it possesses concrete evidence of "the large amount of interest taken at the present time by British firms in the Canadian market, an interest which has been steadily increasing with the slight upward tendency in trade" (*Financial Times*, October 23rd). With regard to the proposals which have been made for opening branches there carrying stocks of British goods, and the establishment of British factories, it is pointed out that the erection of branch factories necessitates considerable capital expenditure, which, in the present position of British trade, the great majority of firms are unable to afford. Our readers have lately had before them the financial results of the operations of a number of enterprising British electrical companies. The times have been unfavourable to them, and what they require as much as anything is more good-paying export business to occupy their works and give employment to their own workpeople. Under such circumstances their present disinclination to lay out capital for *productive* purposes in overseas markets in which they require to *sell* goods is easy to understand. The British manufacturer is trying to stabilise business under extremely adverse conditions, and this is, therefore, an unfair moment to criticise him for not establishing branches in the Dominion.

It is stated that the F.B.I. is acquainted with a great many firms which are going seriously into the question. But the whole question of the establishment of factories in Canada, however welcome to the Canadian as a further development of his country, is entirely a business proposition, and must always be viewed from the point of view of supply and demand, and it is only recently that there has been any evidence that Canadian capital may be available to co-operate with British firms in establishing new industries in the Dominion.

The solution of the question is stated to be entirely dependent on purely economic considerations, and whether or not the reasonable defence set up by the Federation of British Industries relates to the manufacture of electrical goods as well as to general products, it is satisfactory to read that the subject has been thoroughly investigated. At a later date when conditions are better it may require re-investigation. We have long looked for good results to follow the export trade operations of the Federation, and not the least useful part of its work is the deep representative study of such a question as the difficulties confronting us in such a market as Canada.

Small Cookers and Heaters.

We are pleased to see that the point mentioned in our last issue—that the salesmanship lectures of the Electrical Development Association have at times shown rather too great a tendency to wander from salesmanship—has been taken to heart by those responsible for the conduct of these lectures. Mr. L. L. Robinson, of Hackney, who presided at the second lecture, given by Mr. R. Smith, of "Tricity," reported on another page, put the position correctly when he pointed out that the lectures were not arranged to discuss trade disputes, and that there were other means for dealing with these. As a result, we may be said to have had a real salesmanship lecture. The subject chosen by Mr. Smith, *viz.*, small electric cookers and fires, is probably one of the most difficult, if not the most difficult, of all domestic applications of electricity, inasmuch as it involves questions both of wiring and charging. If we take, for instance, a person using electricity for lighting and a convert to its advantages generally, but now using gas for cooking, he is disinclined to face the cost of special wiring for cooking and heating on the one hand, or, on the other, to pay lighting rate for cooking and heating, especially when that happens to be in the region of 8d. per kWh. It will at once be seen that the supply authorities will have to play a prominent part in this development of cooking and heating in small houses or even large ones. It is an old story, but it remains true to-day, that some tariff must be devised which will enable electricity to be used for all purposes in the home through one set of wiring and one meter. Perhaps the advent of the multi-part tariff, compulsorily, will do what is necessary, but there is little doubt that there is a really considerable amount of business to be obtained practically at once if only this difficulty can be got over. One point brought out in the discussion, *viz.*, that of service to the customer, is of vital importance to success. Too often electrical apparatus is sold to a customer and no more interest is taken, nor does the seller seem as if he wishes to hear any more about it. Unfortunately, much apparatus of various sorts is sold nowadays by various people who simply act as a sales medium between the manufacturer and the actual user, and have no knowledge of its construction or use. When anything goes wrong the user is referred to the manufacturer, and usually the blame for any fault is placed upon either of the three by the others. This sort of thing suggests that the supply authority should provide this class of service for the customer if only in the interests of the sale of electricity. That electricity will provide cooking as cheaply as gas is now an established fact; the impediments to progress are outside the questions of efficiency and reliability, and the industry as a whole must work together to remove them.

Dear Japanese Labour.

That Japan is no longer a country of cheap labour is evident from Sir E. T. Crowe's latest report on the economic condition of that country, which is summarised in another column. The fact will still come as a surprise to those who remember the extraordinarily low-priced electric lighting fittings and accessories which reached this country from Tokio workshops during the war. Japan did not escape the general rise in commodity prices which occurred all over the world as a result of the war, and since then little reduction has taken place in the cost of living there owing to a number of circumstances, prominent among which are the expenses of an extravagant naval and military administration and a pernicious policy of restricting the output, notably of coal and copper. The whole subject is of considerable interest to British trade from the point of view of Japan's potential purchases of our goods and of her future competitive power in foreign markets. Paradoxical though it may seem, both aspects are fairly favourable to the United Kingdom. Japan still has plenty of money to spend, and although she has lost much of her war-time trade, her consuming capacity is unlikely to be seriously impaired whilst the American demand for silk materials remains good. Since Sir E. T. Crowe's report was written there have been signs that the saner element will succeed in frustrating the policy of curtaling output and will bring prices down.

Taxation Problems.

The burden of general taxation has fallen heavily upon individuals, firms and companies as a result of the war and the absence of real and substantial economies in departments of State. In particular, industrial establishments and works continue to suffer from imposts which prevent development and hamper them in the promotion of the export trade in competition with foreign rivals, and at the same time place a check on private enterprise in new directions. Under these circumstances any efforts made with the object of securing a reduction in the level of taxation are very welcome. What the new Parliament will bring forth after the prospective General Election remains to be seen, but the Federation of British Industries, even before there was any immediate prospect of a dissolution of the existing House of Commons, had already inaugurated a campaign in order to obtain the views of manufacturers on questions of taxation. The meetings organised for this purpose in different parts of the country commenced at the beginning of October, and are being continued for at least one month. The Federation hopes to be able to secure a mandate to press for further State economy, a reduction of one shilling in the income tax, and the revocation of the corporation profits tax.

We believe the corporation tax was an importation from Germany, and, like many other imports from that country, it could with advantage be dispensed with. Many, indeed, are the Reich taxes in Germany, but after they have been paid, the industrial companies are able to pay high dividends—in paper marks, of course—as is shown by the rates of distribution now being made by the colliery, iron and steel and engineering companies for the year 1921-22. But if the standard of taxation in Germany, reckoned in sterling, were the same as in Great Britain, it is unlikely that even the high paper mark dividends would be available for distribution. On the one hand, there are many and insignificant taxes accompanied by very busy industries; and on the other a few and heavy taxes and an immense amount of unemployment. It is to be hoped that it will be possible for the new Parliament so to adjust the degrees of taxation as to impart that stimulus to industries of which the country stands so much in need.

Commercial Arbitration in Foreign Trade.

Since referring to this subject in our issue of October 13th, some particulars have become available concerning the court of arbitration which has been established by the International Chamber of Commerce in Paris, which aims at the friendly settlement of disputes arising between firms located in different countries, without the formalities of legal procedure. The particulars have been supplied to a French contemporary (*L'Information*, of Paris) by M. de Lavergne, general secretary of the French committee associated with the court of arbitration.

M. de Lavergne is reported to have stated that the rules of the court provide for three cases: Conciliation, arbitration without legal sanction, and arbitration with legal sanction. In the first instance the conciliation procedure is as simple as possible. When a dispute arises on the question of the interpretation of a contract between business men in different countries, the one party or the other, through the intermediary of his national committee, can apply for the good offices of the administrative commission of the International Chamber of Commerce. This commission, whose president is the general secretary of the International Chamber, is the assembly of the administrative commissioners who are appointed by the various national committees and who represent the latter in a permanent manner at the seat of the International Chamber.

Arbitration without legal sanction, M. de Lavergne says, is effected by the delegates of a court presided over by M. Clémentel and composed only of personalities whose word ranks authoritative in commercial matters in their respective countries. The French arbitrators are M. Roger, president of the Paris Chamber of Commerce; M. du Pasquier, president of the Havre Chamber of Commerce; M. Pradel, president of the Lyons Chamber of Commerce; M. Porte, president of the Tribunal of Commerce for the Seine; M. Duchemin, president of the Union of Chemical Industries; and M. Waddington, formerly president of the Normandy Syndicate of Cotton Weaving.

Awards given under arbitration without legal sanction pledge the honour of the parties who are compelled to comply with them. In the event of the party against whom an award has been made not conforming to the terms of the award within a period of thirty days, the opposing party can inform the International Chamber of the fact. The court then applies to the Chamber of Commerce or other commercial organisation to which the defaulting party belongs, asking this chamber or organisation to adopt suitable disciplinary measures in regard to this member. It is also possible for the court to exact that the name of the defaulting party should be printed in the publications of the International Chamber, as well as the text of the award which has not been complied with.

Concerning the third class, M. de Lavergne states that arbitration with legal sanction takes place under the same conditions, but is necessarily only possible for countries whose laws give to arbitration the force of a legal decision with all its penal consequences. Owing to the non-validity of the arbitration clause in certain countries, and particularly in France, the rules applicable in the latter case provide for the drawing-up of a deed of mutual agreement, the essential conditions of which are fixed by the rules. This arrangement can naturally be modified or amplified should the necessity arise.

The New Session of the I.E.E.

On Thursday next week the Institution of Electrical Engineers will open the new session at headquarters; some of the Territorial Centres have already held their first meetings, and the huge machine will shortly be in full operation. We sincerely trust that the resumption of the professional proceedings will be accompanied by a similar revival of activity in the electrical industry, which has so long been marking time, impatiently awaiting the return of normal conditions.

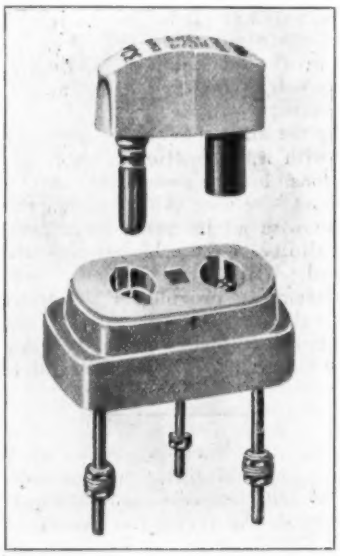
The retiring president, Mr. J. S. Highfield, has been fortunate in holding office during the most memorable year of the existence of the Institution, which he caused to be celebrated in a manner befitting the occasion—the completion of half a century of wholly admirable scientific activity and commendable solicitude for the welfare of the industry. The only regrettable circumstance connected with the function was the unfortunate indisposition which robbed him of the privilege of presiding over the commemoration ceremonies, except at the closing meeting. No such interesting event awaits the new president, whose term of office commenced with the current month, but Mr. Frank Gill will find abundance of useful work ready to his hand—and once more we venture to suggest that the burden imposed upon the president is far too heavy; the vice-presidents, we are certain, would gladly relieve him of a material portion of his labours, were they called upon to do so, and only with their aid will it be possible for a busy engineer to accept the constantly growing duties and responsibilities of the presidential chair without grave detriment to his private interests.

The programme announced for the first part of the session is of excellent promise; the subject of the presidential address remains as usual wrapped in mystery for the moment, but such subjects as the improvement of power factor (a posthumous paper by the late Dr. Kapp), domestic load building, transmission by underground cables at very high pressures, and arc welding, will whet the appetities of technical students of all ages. A useful list of subjects is also forecast for the informal meetings, and there is every reason to look forward to a very successful season.

THE "ELECTRICAL REVIEW" FRENCH TOUR.

(*Continued from page* 547.)

The Société Française Gardy, of Argenteuil, which owns six factories (three in France and the remainder in Switzerland, Spain and Belgium respectively) has for a number of years specialised in high- and low-pressure accessories. The principal work carried on at the Argenteuil factory, which was inspected by a section of the party on October 7th after the visit to Gennevilliers, is the manufacture of low-pressure accessories, and not merely is the metal work machined, but the porcelain and black composition insulating parts are made there also, the company thus having facilities

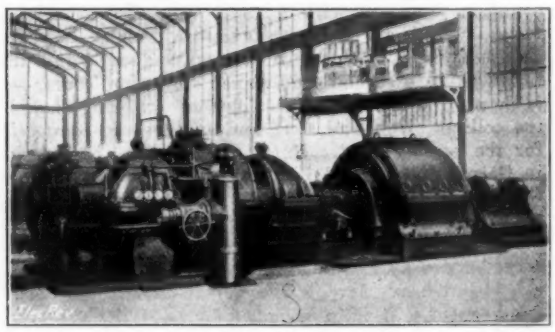


The Gardy Fuse-plug and Socket.

which are almost unique. The porcelain is baked in a continuous kiln with 24 chambers, of which at one time six are being emptied and filled, six being warmed up with the waste gases from the baking ovens, and six carrying on the baking, while the remaining six are being cooled down by the incoming air on its way to the baking furnaces. The system is thus regenerative, producer gas being used for heating.

The company has for a number of years been well known for its system of low-pressure fuse bases of the socket type, with non-changeable two-pin fuse plugs. The fuse wire is embedded in a special sand and then sealed; the fused plugs are exchanged for a nominal sum. As each rating of fuse has a special size and distance of pins, the danger of over-fusing is eliminated. This type of fuse can be replaced by any householder; it is also used in enormous quantities in the 3-ampere size by the French Post Office for the protection of telegraph and telephone lines. This fuse has in France for a number of years replaced the screw plug type of calibrated fuse; in the latest pattern it is practically impossible to fix a fuse wire and, further, the live parts are very well protected.

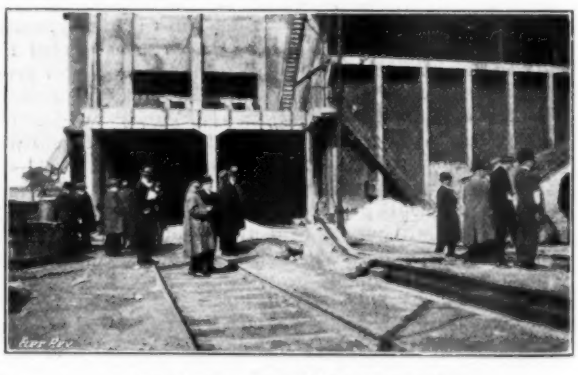
The company also manufactures at the Argenteuil works many types of snap and knife switches. A number of high-pressure aerial switches and pole line accessories are under construction at these works, a well fitted-up test room with a 200,000-volt transformer being provided for the purpose of testing the assembled parts. A feature of the works is a well-arranged laboratory for the chemical examination of raw materials, from the brass and copper to the sand used in the fuses. About 600 hands are employed at present at the Argenteuil works, and one must say that one has rarely seen a series of "shops" kept in such apple-pie order. On looking at the nicely finished material, one can realise that neatness and order in manufacturing have their influence on the products turned out.



Turbine Room at St. Ouen.

On Sunday morning, October 8th, a section of the party, numbering about 20, eschewed the delights of Versailles, preferring to visit the power station of St. Ouen, an excursion which was not included in the official programme, but which well repaid those who took part in it. The arrangements for the visit were made by Mr. Charles Erith, who afterwards entertained this party at lunch at Prunier's. The visitors were received by M. Pécheur, chief engineer, and other directors of the company. This station belongs to the Compagnie Parisienne de Distribution d'Electricité, whose field of operations is the City of Paris, the company being the concessionaire of the Municipality; for this reason it is not at present a member of the Union d'Electricité. The station is situated outside the fortifications to the north of Paris, close to Gennevilliers, and

Concrete Coaling Gantry and Railway.



St. Ouen: End of Coal Railway.

contains eight 10,000-kW turbo-generators, two of which were built by the Compagnie de Fives-Lille, and the remainder by the Atelier de Constructions Electriques du Nord et de l'Est, and the Société Alsacienne de Constructions Mécaniques. The plant works at 12,300 volts, 41⅔ cycles per second, 1,255 r.p.m., and the alternators are of the two-phase type; the latter were designed to carry 12,500 kW continuously for four hours, but during the war years they were still more heavily loaded, without giving rise to trouble. The turbines are of the Zoelly and Rateau types. One of the Fives-Lille sets ran for 45,000 hours without a hitch. The boilers are Belleville and Babcock & Wilcox, with chain grate stokers. Two 50-ton cranes serve the engine room.

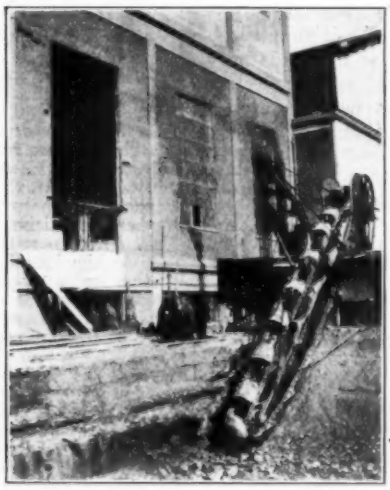
More interesting, however, was the new plant which was being installed. This comprised two generating sets of 40,000 kW each, constructed by the Société Alsacienne, of Belfort, and three more are on order, making a total of 200,000 kW of new plant, which will operate at 12,300 volts, 50 cycles. Additional boiler plant has also been installed, comprising four big Stirling boilers built by the Compagnie Fives-Lille, and equipped with Riley stokers. Six similar boilers are on order. Each of these five-drum boilers covers an area 29 ft. square, and the height from the grate to the top of the combustion chamber—which would make a fair-sized barn—is 30 ft.; the boiler is of the twin type, having two Riley stokers sloping towards the middle, and contains 1,940 3¼-in. tubes in banks 60 tubes wide and about 14 deep, the heating surface being 2,100 m.² (22,600 sq. ft.). The 4-ft. boiler drums are made of single plates, 30 ft. long and 1¾ in. thick where the tubes enter. The boilers are equipped with internal superheaters, and work at a pressure of 20 kg. per cm.² (280 lb. per sq. in.), each evaporating 132,000 lb. of water per hour at normal full load and 176,000 lb. when required. The superheater header is made in two parts, welded together; the heating surface of the superheater is 1,000 m.² (10,764 sq. ft.), and the Green economisers, situated above the boilers, have a surface of 1,706 m.² (18,363 sq. ft.), the tubes being of cast iron. The boiler casing is of steel, lined with brick, the lining at the ends, where it is not protected by tubes, being thicker than at the sides. The boiler-house, like most of the station buildings seen in France, is largely of reinforced concrete construction, with concrete hoppers over the firing floor; there are no overhead bunkers, and consequently the boiler-house is exceptionally light. It is interesting to note that the Riley stokers, which feed from both sides of the boiler, were made to gauge and were not assembled until they arrived on the site.

Coal is received in barges on the Seine, holding 1,350 tons each, from which it is grabbed by two cranes and dropped into hoppers; electrically-driven trucks are filled from the hoppers and run along an elevated railway the full length of the works, distributing the coal through hoppers. Storage tanks alongside of the railway have a capacity of 30,000 tons, sufficient for the needs of the undertaking for one month, and provision is made for submerging the coal in storage, thereby saving a few per cent. of the calorific value and reducing the cost of fire insurance. The chutes are so arranged that the coal sliding down into the storage tanks is distributed over a wide area. From the tanks it is raised by an electrically-driven crane and grab, and dropped into hoppers, whence duplicate B. & W. bucket chain conveyors carry it up to the stoker hoppers.

Water is derived from the River Seine through duplicate wire screens, which can be raised singly and cleaned with water jets; this arrangement has worked well during the past eight years. Settling ponds are provided, the water being charged with sand. The pumping plant is situated in an open basement running alongside of the engine-room.

Rateau fans are provided below the boilers for forced draught, and the Prat draught system is used for the waste gases, with the usual short steel stacks; the latter are being erected with the aid of steel gantries, which can be moved along from one to another. The Prat draught equipment is also installed at Gennevilliers, on the largest scale as yet attained.

Side View of Coal Railway.



Excavator Digging Foundations for Extensions.

Erecting the Prat Chimneys on Top of Boiler-house.

The newest feature of the plant is the system adopted for the removal of ashes. Ash grinders are not used; the ashes are dropped through hoppers into a trough 2 ft. wide, along which they are carried by a stream of water to a sump, whence they are lifted with a grab and dropped into hoppers for removal by trucks. The same water is continuously circulated through the ash channel. The coal derived from Northern France has a calorific value of about 13,300 B.th.u. and contains 12 per cent. of ash. British and German coal is also used. The ash is used for making bricks in an adjoining brickyard.

The annual output of this station is 300 million kWh; the plant connected to the mains is rated at 430,000 kW, of which about 100,000 is normally in use, the maximum demand being 120,000 kW. There are 300,000 consumers; many small industries derive their power supply from St. Ouen. No price concession is made to consumers of electricity for heating purposes in Paris, owing to the terms of the concession from the City.

Lea recorders are used in the engine-room, and a variety of instruments are installed in the boiler-house, with a view to maintaining high efficiency in operation. The lay-out of the station is very convenient; special attention has been devoted by M. Pécheur (chief engineer) and his colleagues to securing reliability of

supply and low maintenance costs, and the visiting engineers were greatly interested in the means adopted to this end.

In order to arrive at a uniform frequency of supply, the older portion of the plant, designed for 41⅔ cycles, is being gradually speeded up and will eventually supply at 50 cycles, like the new generating plant. It will then be possible to interconnect the St. Ouen and Gennevilliers power stations, with the intermediary of Scott-connected transformers—for the cost of converting the existing two-phase system to three-phase would be prohibitive.

On Monday morning, October 9th, an early start was made by train for Arras, where the party boarded a fleet of motor-cars for the next stage of the tour. From the railway many traces of warfare were visible, and those who had the good fortune to travel with members intimately acquainted with the route and the events that occurred in that region found the journey exceedingly interesting. The 60,000-volt overhead transmission line from Gennevilliers to Creil was seen alongside of the railway, and the well-wooded rolling country, adorned with autumn tints, presented a charming appearance on the way to Amiens. After passing Albert, the scenery changed, the route crossing and recrossing the line where the trenches had been; the most noticeable signs of battle were the innumerable dead tree trunks, shell-holes, and ruined buildings, and saddest sight of all, the cemeteries. Over all the waste Nature had flung her green mantle, the trenches had been filled up, and the wire had been gathered into huge piles of rusting steel.

Soon after leaving Arras a halt was made at St. Nicholas to visit a high-pressure sub-station on the system of the Société Electrique du Nord-Ouest, a company somewhat analogous to our Power Companies, which distributes electrical energy in bulk over a large area.

(To be continued.)

SINGLE-PHASE COMMUTATOR MOTORS.

There was a very large attendance at the meeting of the National Association of Supervising Electricians on October 10th, to hear a lecture by Mr. F. Creedy on "Single-phase Commutator Motors, their Progress and Reasons why they Demand the Attention of Power Engineers." Mr. W. E. Highfield presided.

The lecture may be said to have brought into a true perspective the real position which the single-phase motor will occupy in the general scheme of electricity supply, at any rate in the near future. It is possible to produce these machines at a price very little higher than that of the direct-current motor and quite as low as that of the old-fashioned type of single-phase machine. The Creedy motor has been redesigned and Mr. Creedy claims that the single-phase commutator motor can now take its rightful place as the correct machine for the supply of power to lightly-loaded districts or areas where the motor load is not the predominating feature.

The advantages of single-phase distribution are well recognised, but, said the lecturer, these advantages have hitherto not been available owing to the importance of the motor load to every supply authority and the very low average power factor—frequently not greater than 0.5—produced by the old-fashioned type of motor. Mr. Creedy did not place the claims of single-phase distribution too highly, but restricted them to small towns or self-contained districts where no great density of motor applications was to be expected or where the chief load did not consist of motors. Such a single-phase system should preferably receive a bulk supply from a large polyphase system, the district supplied with single-phase energy being sub-divided so that the total power supplied was fairly well balanced among the three phases, bulk three-phase supply being given to a local sub-station and sub-divided at a local switchboard. Within this sphere, the system was to be regarded as superior to all others, and in support of this, it was pointed out how the small independent direct-current systems of a large number of towns were being changed to single phase so as to permit of bulk supply without the installation of rotating apparatus in the sub-station. This was facilitated by the facts that single-phase mains were identical with direct-current mains and that with single-phase supply, cable faults were fewer than with direct current, a figure of 1 to 5 having been mentioned to Mr. Creedy.

Curves and diagrams were shown illustrating the single-phase commutator motors manufactured under the Creedy patents, and comparisons were made between them and the squirrel-cage and direct-current types. It was pointed out that a particularly noticeable feature of the compensated single-phase motor was that it retained its high power factor down to a quarter full load. A comparison of the current taken by a split-phase type of motor showed this to be 36 per cent. greater at full load and 82 per cent. greater at half load than that of the Creedy type.

A curve was exhibited which showed that the price of the modern single-phase motor was only from 4 to 10 per cent. above that of the direct-current motor, and almost exactly the same as that of the single-phase slip-ring induction motor throughout the range shown. The weights of single-phase motors were only about two-thirds of those of the corresponding direct-current motors and efficiencies were only slightly lower, being superior in most instances to those of the split-phase motor.

The lecturer then recapitulated the description given in his previous paper before the Association of the principal properties of the compensated type of motor. Emphasising the need for high power factor apparatus, it was pointed out that once low power factor apparatus was on the mains it cannot easily be got rid of, and would continue to load them up with non-revenue-producing current when a revenue-producing load was immediately available. If it were possible to change all the split-phase motors on the mains to unity power factor apparatus, it was estimated that the existing mains throughout the country would still be from 15 to 20 per cent. in excess of requirements, but, of course, some thousands of h.p. of motors of the old type now on the mains could not be got rid of without very large capital expense.

Discussion.

The discussion on the lecture was to a considerable extent an expression of satisfactory service with the type of motor advocated by Mr. Creedy, but there were several useful criticisms based on experience with their use which should be valuable to those responsible for the design.

Mr. Pooley (Messrs. Pooley & Austin) said that being associated with Mr. Creedy as he was, he felt that the points of the motor had been put very clearly and preferred to leave it to others to criticise.

Mr. Wreford related criticisms of the motor that had been made to him by other people. It had been queried, he said, whether unity power factor could really be got, but he believed the lecturer must have convinced everyone that this was an every-day result. The difficulty appeared to be that many people did not sufficiently understand its characteristics and were sometimes almost frightened of it. As an example of the manner in which these motors were being used, he mentioned one supply undertaking with more than 3,000 h.p. connected of which more than one-third was of the compensated commutator type. There was a tremendous saving in switchgear and transformers as compared with the use of direct current, and some supply authorities were welcoming the change over to single phase even where there was a fairly large amount of power.

Mr. Smith said that in printing works they converted from single phase to direct current with a consequent loss of about 20 per cent. If the machine compared favourably with a d.c. one with regard to speed variation, and unity power factor could be obtained, its use would be a great advantage.

Mr. Harmer said the most important point in connection with this motor was the power factor. His own experience with the compensated commutator type of motor had been very satisfactory, although he believed there were about 40 brushes on a 40-h.p. machine and, as these cost about 2s. 6d. each to replace, the cost of maintenance might be serious. His fear on this score, however, had not been borne out in practice. As to variable speed, in London the requirement was not so much for a variable speed as for one or two speeds, and a Creedy motor with three speeds would fill the bill entirely.

Mr. A. L. Johnson gathered that the lecturer claimed only about 25 per cent. of what his salesmen claimed. If unity power factor was really obtainable, he could not understand why all station engineers did not insist upon Creedy motors being used. He was not quite certain whether it was claimed that this motor was so good as to be comparable with the direct-current motor.

Mr. Creedy: It is.

Mr. Johnson pointed out that in the comparison of weights that had been given in the curves, no particulars were stated as to the type of d.c. motor with which the comparison was made.

Mr. Creedy explained that the d.c. motor in that case was one of the best known modern machines made by one of the largest makers of the day.

Mr. Johnson said he had come to the conclusion that although the Creedy machine was a really practical proposition for single-phase circuits, it had limitations. The starting torque was about the same as that of the direct-current motor, but it did not compare so far as variable speed was concerned.

Mr. McGillivray asked why it was that the transformers

supplied with the machines often burned out. He had had one of these machines at work for about four years and the speed decreased by some 20 per cent. On turning the commutator up, however, the speed rose again almost up to the original. In his case, the system was single phase, 90 periods, which was rather a difficult one for the motors, but apart from the trouble he had mentioned, the motors had given good service.

Mr. Giffard asked whether Mr. Creedy had considered the possibility of getting a continuous change of speed by using an induction regulator instead of a transformer, and so injecting into the windings a gradually increasing e.m.f.

Mr. Bates said that so far as price was concerned, the motor itself was reasonably cheap, but the cost of starting gear seemed to put it out of court. The cost of maintenance would be higher than that of either the d.c., or squirrel-cage machine. Especially would this be so with regard to re-winding, because the ordinary repair shop would not be prepared to take the job on, or if it did, the price would be very much higher than in the case of the other two types of motor. He had never been able to get any definite information as regarded power factor.

Mr. Wreford agreed that contractors and repair people should know more about this motor than they did, but he added that a company with which Mr. Bates was concerned had recently taken on the repair of Creedy motors.

Several other speakers took part in the discussion, and among the points raised was the importance of correcting power factor in view of the fact that when bulk supply becomes more general, charging will be on the kVA and not the kW basis. The necessity for single-phase motors to conform to the conditions at present attaching to d.c. machines was also commented upon.

Mr. Creedy, replying to the discussion, said that the best results were obtained as regarded speed variation, with a range of 2 to 1, but they had built motors with a speed range of 3 to 1. The motors could be built for any voltage desired and constant-speed, single-phase, motors had been built for 2,000 volts, but there was not a great demand for h.p. motors of this type. At present they had not been standardised above 440 volts and the lowest was 100 volts. Owing to the low voltage and the easy duty on the brushes the renewals were very light. On the point raised as to transformers burning out, a new type of machine had been placed on the market and the old starting gear had been done away with; the starting gear was now essentially the same as in the case of the d.c. motor. The only reason why induction regulators were not used was cost; moreover, they had never actually been used because these motors were never built for several hundred horse-power, and in the case of the small motors, the cost of the induction regulator would put them entirely out of court.

People were quite familiar with the d.c. machine, whereas that was not so with the single-phase motor. All new apparatus had to fight against this.

THE NORTH WALES AND CHESTER ELECTRICITY DISTRICT.

Draft Constitution of Joint Electricity Authority.

The provisional delimitation of this area by the Electricity Commission was announced in July, 1920. In January, 1921, the Chester Corporation submitted a scheme for the improvement of the existing supply of electricity in the district, and in the following month the North Wales Power & Traction Co. did likewise. During the same month the Commissioners held their first local inquiry in connection therewith, and the decision they reached in consequence thereof was published in April, 1921.

The Commission has now issued the draft North Wales and Chester District Electricity Order, 1922, in the first schedule to which the scheme constituting the area and establishing the Joint Electricity Authority is set out.

The first annex to the Order deals with the qualifications and appointment or election of members; tenure of office, casual vacancies, &c.; provision as to the election of elected members; and meetings and proceedings of the Joint Authority. The second annex outlines the technical scheme, while the third annex sets out the agreement that has been come to between the North Wales Power Co., Ltd., and the Aluminium Corporation, Ltd.

The second schedule specifies the powers, rights, and obligations conferred or imposed upon the Joint Electricity Authority by the Electricity (Supply) Act, 1919, and the present draft order, which are to be transferred from the Joint Authority to the North Wales Power Co., Ltd.

The draft order will come into operation on the date on which the above-mentioned deed of transfer is approved by the Electricity Commissioners, and as soon as it has been approved by a resolution passed by each House of Parliament.

As already announced, the Electricity Commissioners are to hold a second inquiry at Llandudno, on November 14th, with reference to the aforesaid scheme, and in order finally to determine the area of the proposed district.

LEGAL.

"Mr." or "Miss."

In the Shoreditch County Court, on Friday last, before Judge Cluer, Alfred Evans, of 35, Great Eastern Street, E.C., dealer in electrical motor accessories, sued Miss Mary Flanaghan, of 86, Copenhagen Street, E.C., also alleged to be a dealer in electrical goods, to recover £11 17s. 3d., balance of an account for goods supplied. The defence was that she had never ordered any goods, and that the business was not hers, but that of "Mr. M. Flanaghan." Judge Cluer (to the defendant): In your country that "M." might stand for Michael, but in this district it would be Moses or Morris. (Laughter.) The plaintiff proceeded to prove his case, and a number of dispatch notes were produced, most of them being in the name of "M. Flanaghan," but some of them "Mr." The plaintiff said he had always considered himself to be trading with the defendant. He had sent applications for the money and invoices to the defendant, which had not been returned.

Wm. Cranbon, in the employ of the plaintiff, admitted that Mr. Flanaghan or the boy always came for the goods, and that he had not seen the defendant, and practically the same was said by Chas. Wright, another employé.

Judge Cluer said the plaintiff had failed to prove that the business belonged to the defendant. He seemed to have been under the impression he was serving "Mr.," according to the salesmen, but when he made inquiries he sued "Miss." He advised the plaintiff to collect better evidence for a future hearing. All the same, he told the defendant that she was doing a foolish thing to defend the action on such lines, if she were really the owner of the business, as it would cost her a lot of money in the long run.

Robinson v. Dannatt.

In the King's Bench Division, before Mr. Justice McCardie and a common jury, on November 18th, Mr. Isaac Vincent Robinson, of Walton-on-Thames, who holds the position of assistant secretary of the British Electrical and Allied Manufacturers' Association, claimed damages against Mr. A. Keith Dannatt, of Thames Ditton, for personal injuries and damage to his motor scooter resulting from a collision with defendant's motor-car on the Portsmouth Road between Cobham and Ripley on March 25th last year.

Plaintiff's case was that defendant, who was driving in the opposite direction, negligently and improperly swerved to the offside, so as to pass in front of him, and knocked him down. He was seriously hurt, his injuries including a fractured leg, and he still had to use a crutch. He was unable to perform his secretarial duties for five months, though his employers continued to pay his salary of £1,150 a year.

Defendant denied all plaintiff's allegations of negligence, and asserted that the accident was due to plaintiff's fault. Defendant counterclaimed for damage to his motor-car.

The jury found that defendant was not to blame, and his Lordship directed judgment to be entered for defendant for the amount of his counterclaim, £23.

Marconi's Wireless Telegraph Co. v. Mullard Radio Valve Co.—Judgment.

Mr. Justice P. O. Lawrence, in the Chancery Division on Thursday last week, delivered judgment in this action, which was brought by the plaintiffs for an injunction to restrain the defendants from infringing their Letters Patent Nos. 28,412 of 1913 and 126,658, and for the delivery up of the articles made in alleged infringement of the Letters Patent, and also for damages.

Plaintiffs are owners of the patent granted to the company, and Mr. H. J. Joseph Round for an invention of alleged improvements in receivers for use in wireless telegraphy and also of a patent granted to Michel Peri and Jacques Biquet of an alleged invention of "improvements in or relating to vacuum tubes." Plaintiffs complained in particular of the sale by the defendants on or about July 8th, 1921, of "L. R. Valves," constructed, it was alleged, in accordance with the inventions described in the specification of the patent of 1913 and in all the claiming clauses of the other patent, No. 126,658.

Defendants denied the alleged infringement. They admitted that they sold and manufactured considerable numbers of thermionic valves, but they alleged that in fact such manufacture and sale was by them as agents or contractors of H.M. Government, and in particular the Admiralty, on written authorisation in that behalf, and they denied that such valves constituted an infringement of either of the patents, and they further relied on the provisions of Section 29 of the Patents and Designs Act, 1907, as a defence to the action. Defendants also pleaded that the plaintiffs' Letters Patent had been at all material times invalid.

The trial of the action took place in July last, and after hearing a great deal of contradictory and highly technical evidence the learned Judge reserved his judgment. The case was reported in the Electrical Review of July 28th and August 11th, 1922.

In giving judgment on October 19th, his Lordship said the plaintiffs alleged that the defendants had infringed both the

Letters Patent belonging to them, and which he would describe as Round's patent and Peri's patent, and the plaintiffs claimed an injunction to restrain the alleged infringement. Defendants disputed the validity of both Letters Patent and also denied the alleged infringement. Although both inventions related to three-electrode valves, they were, in his judgment, essentially distinct, and must be dealt with separately. His Lordship first referred to Round's patent, and having read the claiming clauses of that specification, said that in 1904 Fleming invented a two-electrode valve, consisting of an evacuated glass bulb which contained a filament and a metal cylinder, and this valve operated to rectify or transform an alternating current into a continuous current capable of actuating a galvanometer by which signals could be read. In 1908 De Forest discovered that by introducing into a valve of the type invented by Fleming a third electrode in the shape of a grid interposed between the hot filament and the anode, the sensitiveness of the oscillation detector was increased. He did not think, from a perusal of the complete specification, that De Forest appreciated the great advantages of the introduction of the third electrode. Indeed, it seemed to his Lordship that it was doubtful, whether he even appreciated that his valve would act as an amplifier. His Lordship then referred in great detail to the invention of Von Lieben in 1911, and said that in his judgment the particular form of grid described in the claim of Round's patent was one of the essential elements of that claim, and that unless a valve contained a grid in that particular form it did not infringe, even although it contained the other two elements, *viz.*, a hot filament and a cylindrical anode. The Mullard valve was a "hard" valve, which contained a grid in the form of a loose open-ended cylinder placed round the hottest part of the filament. Hard valves first came into use some time after the date of Round's patent. Nothing was said in Round's patent as to the shape which the filament was to take, and therefore the difference in the construction of the modern three-electrode valves which were not in practical use at the date of Round's patent, would not of itself prevent a three-electrode valve containing Round's grid and anode from being an infringement. The main object of Round's invention, as stated in the specification, was to shape the two electrodes in such a manner as to shield the glass from the cathode stream and thus prevent it becoming electrified.

Having referred at great length to the expert evidence given at the trial and the documents put in evidence, his Lordship said he came to the conclusion that none of the documents relied upon by the defendants disclosed either Round's invention or Peri's, and that in both of those the inventions were both novel and useful, and that in both there was good subject-matter. He thought that the attack that the defendants had made on the question of validity failed. He thought that Peri's patent was a combination patent claiming a novel and ingenious method of shaping and arranging the various parts of the valve. Upon the evidence, however, he came to the conclusion that what the defendants had done did not infringe either of the plaintiffs' letters patent, and the action would be dismissed.

It was decided that the question of the costs of the action should be argued and decided at a later date.

British Electric Vehicles, Ltd.

The petition for winding up this company, which came before Mr. Justice P. O. Lawrence on October 17th, was withdrawn and dismissed without costs. We understand that four-fifths of the unsecured creditors had agreed to oppose the petition.

British Thomson-Houston Patents.

In the Chancery Division on Tuesday, the British Thomson-Houston Co., Ltd., were plaintiffs on two motions against the Incandescent Syndicate, of Castle Arcade, Cardiff, and Collinson Bros., Millgate Street, Bradford, for injunctions restraining them from infringing the plaintiff company's letters patent for improvements relating to evacuated vitreous containers having sealed-in conductors.

Mr. Trevor Watson appeared for the plaintiff company, and Mr. Courtenay Terrell for the two defendants.

There was no defence in either case, and orders were made as asked for, the parties having agreed to the form to be sanctioned by the Court.

Associated Electric Traders, Ltd.

The petition of Superlamp, Ltd., on October 24th came before Mr. Justice P. O. Lawrence in the Companies' Winding-up Court, the petitioner asking for the compulsory liquidation of the above company. Mr. Turner, for the petitioners, asked that the petition should be dismissed. Mr. Gavin Simmonds, on behalf of Cox & Co., creditors for £500, asked to be substituted as petitioner and proceed for a winding-up order.

Counsel for the company said he could not oppose the order being made.

In the result his Lordship substituted Cox & Co. as petitioners, and made the usual compulsory order.

SALESMANSHIP IN RELATION TO SMALL ELECTRIC FIRES AND COOKERS.

Mr. R. Smith, of "Tricity," gave the second of the E.D.A. salesmanship lectures this session at Caxton Hall on October 20th.

Mr. L. L. Robinson, borough electrical engineer, Hackney, who presided, pointed out that these salesmanship conferences should not be used for discussing trade squabbles, such as trade discounts and similar matters, but should be devoted solely to the matter of salesmanship. The object of them was to awaken general interest in the goods they had to sell, to endeavour to find means to keep that interest awake, how to convince the customer and secure his order, and how to make him a friend of the salesman. A salesman should have personal enthusiasm and confidence in what he was selling and, above all, he should study the psychology of the customer. As to dealing with technical matters at these conferences, here again the industry had become standardised to a very great extent, and the great need was for the commercial man to develop the industry. Salesmanship had been neglected to a very large extent in the past, but it was salesmanship which was the potent factor in reducing costs, inasmuch as it would help to bring more apparatus into use, and so bring down the cost of the apparatus and also of electricity.

Mr. Smith, who dealt exclusively with small electric fires and cookers, said that probably the first question which a salesman was met with was: "How does it compare with gas?" In this matter of comparison he could not do better than take the case of Hackney, where Mr. Robinson was conducting a very vigorous heating and cooking campaign. At Hackney electricity was available for these purposes at 1d. per kWh, whilst gas cost 10d. per therm. The class of user at Hackney probably used the boiling ring section of the cooker far more in comparison with the oven than was the case in most places, yet the following unsolicited testimonial had been sent to Mr. Robinson: "I believe that the cost, apart from the saving from waste, amounts to little more than half the cost of cooking by gas. I have kept a regular weekly record of the consumption figures and I have found that the electric cooker can be relied upon to do its work within a given time, which experience will tabulate." Again, running costs of a small radiator compared very favourably with gas. Taking an average sized gas fire using 30 cu. ft. of gas per hour and a 2-kW electric fire, it was pointed out that 30 cu. ft. of gas per hour at a standard of 500 B.th.u. meant 15,000 B.th.u. per hour. As 100,000 B.th.u. constituted a therm, it followed that one therm would be used in 6⅔ hours, which, at a cost of 1s. per therm, would be approximately 2d. per hour. At 1d. per kWh the electric fire would cost the same amount per hour, but in this case the whole of the heat was, of course, given off into the room.

After a brief reference to the rateable value system of charging, which Mr. Smith believed would encourage a person wiring a house, as it involved only one set of wiring circuits and one meter, the paper pointed out that whatever the advantages of the radiator on the peak load during a cold snap, the central station had an almost ideal field before it in electric cooking, but some engineers had allowed cooking to be looked upon by the gas companies as their very own field. Fortunately this was not the case throughout the country generally, and there was no doubt that the public only required hiring facilities and a reasonable rate of charge to enable the central station engineer to secure this valuable load.

It was urged that an electric kettle with a self-contained element should always be supplied with an electric cooker owing to the greater rapidity with which water could be boiled compared with the boiling ring of the stove. Another factor of importance to the salesman was that he should be able to tell the prospective customer that he was himself using the apparatus which he was trying to sell. Advisory service should be given at the time of installation and at intervals subsequently. Hints should be offered on the advantages of using the residual heat of the hot-plates and oven for water heating for washing-up purposes, how one boiling plate might be used for boiling and simmering, and exactly what the possible economies to be effected really were. There were simple rules whereby the salesman or demonstrator might give the time required for boiling a given quantity of water because nothing was so liable to shake the interest of a client as the feeling was that a guess was being made to provide an answer. One of the most important questions was the reliability and length of useful life of the apparatus. All leading makers now gave one year's guarantee with their apparatus, and maintenance schemes could usually be arranged. Oven elements could be

made to give an indefinitely long life, and present-day boiling-plates were capable of giving very long service without attention.

The paper concluded by stating that electrical men should think and talk of electric cooking, heating, and general domestic applications of electricity as something which was very much of the present, to be used by themselves alike with the public.

In the ensuing discussion Mr. A. C. Cramb (Borough Electrical Engineer, Croydon) said that very carefully thought-out schemes were necessary, and personal attention should be given to every cooker sent out. At Croydon a lady demonstrator was sent along to the customer to give advice, and kept in touch with the customer afterwards. The results had been very satisfactory.

Mr. Joyce urged the necessity for doing everything to avoid having discontented customers, who would most certainly spread their discontent. Care should be taken that apparatus was not run on the lighting circuit, as that would make the cost too high and would militate against the use of irons, kettles, &c. Another drawback was that not enough instructions were issued with the apparatus.

Mr. Young suggested that more demonstrations should be given by persons who understood the apparatus. He deprecated the policy of selling small radiant heat fires as electric heaters; they would not warm a room, and were not intended to.

Mr. Berry said that many small electric fires could be sold if their uses were made known. As regarded cookers, he had proved that there was a tremendous saving in the shrinkage of the meat. The money in this business was colossal, and it was up to them to believe in this proposition and get on with it.

Mr. W. A. Gillott advocated that women should be used more than they were for selling electric cooking and heating apparatus; one of the first essentials was that the seller should use the apparatus that was being sold.

Mr. Roberts asked how often they heard a salesman tell a customer that an electric toaster would make 60 pieces of toast per kWh of electricity; that a small griller would grill four large pieces of steak per kWh, or that a two-pint kettle would boil 17½ times per kWh? He urged those who had to deal with this matter to abandon scientific salesmanship and talk facts in plain English.

Mr. Shears strongly supported the suggestion that there should be demonstrations, and expressed the opinion that the cooking load was the load of the future.

Mr. F. W. Leevers pointed out the necessity for putting in as many power points as possible when wiring house, and thought the first thing to do, in attempting to sell cooking apparatus, was to convince the customer that it was cheaper than gas.

Mr. R. W. Hughman (*Electrical Times*) spoke of the crusade in America by the electrical industry for having plenty of convenient points in every residence. Once they were in, their use could always be advocated by the contractors and supply authorities.

Mr. G. Leevers disagreed with the suggestion that there should be saleswomen, but thought there should be women demonstrators.

Lieut.-Col. W. A. Vignoles (Chief Electrical Engineer, Grimsby) said that too much was being said about cost, but what they wanted to impress upon the customer was what he would get out of the apparatus. If the proposition was not a good one, then the salesman should be honest enough to tell the customer so.

Mr. Howell impressed upon salesmen the necessity for obtaining knowledge of the right kind about their goods.

Mr. A. Gowans Whyte (*Electrical Industries*) said that not enough instances of actual transactions were given. In his own electric home the consumption was only about 70 units per week, with six in family and an exceptional amount of cooking owing to delicate health. With a well-trained cook the consumption could be reduced considerably.

Mr. Beaver advocated the need for service as well as selling apparatus.

Mr. F. M. Long (Chief Electrical Engineer, Norwich) suggested that the limitations of an article should be studied as well as its possibilities.

Mr. Mann also urged that it was a bad policy to sell an article merely for the sake of selling it.

Mr. Clay said the public should be impressed with the fact that electrical apparatus was "foolproof" at present. At one time this was not so.

Mr. Smith, replying to the discussion, said that he stood for everything that was straightforward with the customer. He would not advise a customer to install a cooking apparatus when electricity was 4½d. per kWh for instance. As to maintenance, that was most important; customers undoubtedly appreciated personal attention.

A Large Rotor Forging.—Messrs. Somers, Ltd., of Haywood Forge, Halesowen, have made one of the heaviest steel forgings ever produced in the Black Country—a rotor of 40 tons weight—for a generating set ordered by the Birmingham Corporation Electricity Supply Department.

CORRESPONDENCE.

Letters received by us **after 5 p.m. on Tuesday** *cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.*

The Art of Getting a Job.

Could you or any of your readers offer any solution to the following? I have been out of work since April last and have answered countless advertisements in your and other papers for a storekeeper and assistant counter sales clerk, &c.

I have had some ten years' experience in the various branches of the business, including wiring, and have a good technical knowledge, am a good and willing worker, have A1 references, an abstainer, and am good at figures.

During the past six months I haven't had one reply to any letter. The salary asked for in most cases is from £2 10s. to £3, according to what the advertisement is for. Am I asking too much or too little?

"?"

October 22nd, 1922.

"How NOT To Buy."

The last paragraph of Mr. Shandy's letter in the current issue of the Electrical Review explains fully why this correspondence commenced.

I am not "resting," therefore I will conclude my contribution to this discussion in my usual "practical fashion":—

If factors are not required, manufacturers can refuse to supply and contractors can refuse to purchase from them.

W. C. Jeary,
Managing Director.
The Jeary Electrical Co., Ltd.

London,
October 21st, 1922.

[This correspondence is now closed.—Eds. Elec. Rev.]

Wages Variation in the Electricity Supply Industry.

Notice has been given from the employers' side to terminate an agreement which hitherto has worked with a minimum of friction, notwithstanding that all the advantage has not been with the employés.

If the employers' side of the National Council is sincere in its desire for improved relations between employer and employé, would it not be tactful to "leave well alone?" as it must be obvious that this endeavour to smash an agreement which has existed little over twelve months is hardly making for confidence, and only tends to establish an unhealthy precedent.

One wonders how much publicity would have been given to the position if the initiative for the termination of an honourable agreement had been in the reverse direction.

It is admitted that workers in some industries are lower paid, but (I feel sure my Hibernian friends will excuse me) is it a fair policy to adopt the Irish method of raising the roof by digging a hole in the floor? for due consideration should be taken of the fact that supply station men have not been amongst the most highly paid in the past.

In conclusion, it must be frankly stated that electrical workers expect some tangible evidence that the war-time promise of a better standard of living for the workers shall be realised, and this notice to terminate the agreement hardly points to a move with that desirable end in view.

A. Burton.

London, *October 16th*, 1922.

Installations by Unauthorised Persons.

I quite agree with "Contractor's Foreman" *re* his remarks about plumbers doing electrical work; also many steam, gas, and water fitters are styling themselves electrical engineers, &c. These sixpenny-book learned jobbies may have a little too much on their shoulders. Here is one example:—"So and So & Co., Ltd.," Plumbers, Gasfitters, Hot and Cold Water and Steam Engineers," and in larger letters, "Electrical Engineers." These are not proper firms with individual section representatives, but small budding firms. If the matter is left too late I am afraid the electrical contractor will have to buy a sixpenny book on plumbing, &c.—if they can get books printed with simplified diagrams and connections, &c., similar to books on electricity. I suggest that these cheap books should be reviewed by some body similar to the I.E.E. and all matter detrimental to the electrical contractor of recognised repute should be omitted. This, I believe, would put a stop to Mr. Gas and Mr. Plumbob Joe, &c. What's done can not be very well undone, but I blame the electrician for being too fond of parting with his hard-earned knowledge. I don't see that it would retard apprentice electricians and those of a genuine nature, but it would relieve us from an overcrowded profession, and instead of plumbers looking up their diagrams of connections *re* electrical work they would be compelled to send for an electrician who was an *electrician*.

High-Tension Paste.

October 21st, 1922.

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BUSINESS NOTES.

Bankruptcy Proceedings.—Wm. Henry Roslington, 240, High Holborn, London.—This bankrupt who had carried on business as the "Greenling Electric Supplies" failed last April, and on October 17th, he applied to Mr. Registrar Mellor at the London Bankruptcy Court, for an order of discharge. Mr. Walter Boyle, Official Receiver, reported that the liabilities amounted to £1,375; no assets were disclosed and nothing was likely to be received from the estate. Between December, 1919, and May, 1920, the bankrupt carried on business in partnership as "Greenling Electric Supplies." That business was financed as to £600 with borrowed moneys, and was insolvent in May, 1920, when the partner retired and the bankrupt took over the assets and liabilities. In June, 1920, he formed and became managing director of the Greenling Electric Supplies, Ltd., to which two persons subscribed £1,100 for shares, and in September, 1921, he transferred his own 1,000 vendor's shares (estimated to be of no value), to one of the said subscribers without consideration. The bankrupt attributed his insolvency to his household, personal and medical expenses having exceeded his income; to law costs, and to loss over the purchase and sale of some steel. The only offence alleged by the Official Receiver was the insufficiency of assets to equal 10s. in the £ on the amount of the unsecured liabilities, and the discharge was granted subject to a suspension of eighteen months.

George William Humphry, trading as the Humphry Electrical Co., 24, Broad Quay, Bristol, electrical engineer.—The first meeting of the creditors of the above was held on October 18th at the Official Receiver's Offices, 26, Baldwin Street, Bristol. The statement of affairs showed liabilities to unsecured creditors £285, while there were partly secured creditors for £182, and the assets were estimated to realise £339. Debtor attributed his failure to bad trade, loss of capital (£68) in Farrow's Bank, and depreciation of shares in a company. It appeared that in 1917 he started business with £30 in cash, and was the owner of two houses of the value of £600. The matter was left in the hands of the Official Receiver as trustee. The following are creditors:—

	£		£
Callender's Cable & Construction Co., Ltd.	16	Metro.-Vickers Electl. Co., Ltd. Salvage & White	49 17
Electrical Components, Ltd. ...	18	English Electric & Siemens Supplies, Ltd.	10
Gooding, M. C., & Co.	15		
Maggs, H.	20	Western Trading Co.	18

Frederick William Williams, Gradus Works, Porthcawl Road, Sydenham, engineer.—The adjourned public examination of this debtor was held recently at the Court House, Greenwich. Debtor stated that in December, 1919, he had about £4,000, including £800 in a business at Finchley, and started an electrical engineering business at Sydenham. In June, 1920, he agreed to buy the Gradus Works for £4,750, another business at Willesden for about £300, and also to pay £1,000 to the patentee of an electrical switch, and £200 to two people interested in the patent. He also incurred liability for £357 in connection with premises at Queen's Gate Place Mews. When he took the Gradus Works he paid £750 in cash, and undertook to pay the remainder by instalments of £1,000 every six months. Six months after taking the works he was first able to put the switch on the market, and meanwhile he had incurred considerable expense in machinery, wages, &c. He had borrowed over £10,000 from a certain gentleman, none of which had been repaid. In March this year he had had recourse to moneylenders. His profit and loss account to September, 1921, showed a loss of over £2,000. In July, 1921, he entered into a contract with a firm to sell his switches, but they failed to take anything like the number agreed upon. The statement of affairs showed ranking liabilities of £19,012, against assets of £35,965, so that a surplus was shown. In October, 1921, he agreed to purchase the "Retreat," at Crawley, for £3,750, paying a certain amount down, and obtaining £3,000 on mortgage. He still owed about £500. After further questions the examination was again adjourned.

J. Bakewell, electric light and power engineer, 43, Waterside Road, Barton-on-Humber.—Receiving order made October 17th on debtor's own petition. First meeting, November 1st, at the Official Receiver's Office, Grimsby. Public examination, November 9th, at the Town Hall, Grimsby.

H. Symonds, electrical engineer (deceased since filing of petition), late of 1, Lower Downs Road, Wimbledon.—Receiving order made October 16th on creditors' petition. First meeting October 30th at 29, Russell Square, W.C.

J. H. Rigby, electrician, 22, Higher Hillgate, Stockport.—First meeting, October 30th at the Official Receiver's offices, Byrom Street, Manchester. Public examination, November 28th, at the Court House, Stockport.

W. A. Davis, electrical engineeer, 14, Basinghall Street, Leeds.—Trustee, Mr. H. C. Bowling, Official Receiver, 24, Bond Street, Leeds, released October 6th.

E. G. Davis (Davis & Rowe), electrical engineer, 119, Dunraven Street, Tonypandy.—First dividend of 16s. 8d. in the £, payable October 30th at the Official Receiver's offices, 34, Park Street, Cardiff.

Company Liquidations.—Swift Electrical, Ltd., 6, Cork Street, Old Bond Street, W.—The statutory first meetings of the creditors and shareholders of this company were held on October 20th at the Board of Trade Office, Carey Street, W.C. Mr. J. Barwick Thompson, Official Receiver, reported that the order to wind up the company was made last April upon a creditors' petition. The company was registered as a private company on October 10th, 1919, with a nominal capital of £3,000 in £1 shares, of which 800 were issued for cash to the directors, who were also the promoters. They were John Henry Butler, Henry Edward Leigh, and Leonard John Evans; Leigh resigned on January 2nd, 1922, and Evans on November 26th, 1921. No remuneration was paid to directors, *qua* directors, but Leigh was appointed manager and secretary at a salary of £250 per annum, subsequently reduced to £4 a week, and was now a creditor for £44 in respect of those services, whilst Evans was appointed sales manager at a salary of £4 a week and commission. Butler received no remuneration until August, 1921, but was then voted a salary of £50 per month, to include travelling expenses, and he was returned as a creditor for £126 11s. The company was formed to carry on business as electrical engineers and manufacturers of, and dealers in electrical accessories; it took over no business of any description, but Butler had stated that both Leigh and Evans were experienced in the trade and hoped to be in a position to introduce business. Towards the end of 1920 the company found itself in need of funds, and thereupon obtained advances from Butler. In October, 1921, that gentleman had advanced £800 to the company, and on October 8th a debenture for £800 was created and issued to him; it bore interest at 8 per cent., and charged the whole of the assets of the company. Then on January 21st, 1922, Mr. Butler appointed his wife, Mrs. Louisa Butler, as receiver on his behalf; the bond had then been redeemed to the extent of £80, and stood as a charge for £720, plus interest. According to accounts furnished by the receiver, she had sold nearly all the assets and had realised £778, sufficient to pay off the bond and interest and to defray the costs of the receivership. The unrealised assets consisted of book debts, the chief of which was disputed on various grounds, and it was difficult to say whether anything substantial would be realised. The unsecured liabilities were returned at £1,883, and there was a preferential claim of £126 due to Butler as before stated. The failure of the company was attributed by Butler to the fall in the demand for electrical accessories, as the result of which the company's stock had to be sold at a loss, but he (the Official Receiver) thought it was quite obvious that was not the only reason. The company began with inadequate capital, and had had recourse throughout to its bankers or directors for the funds with which to carry on the business. Several creditors complained that goods had been ordered when the directors obviously knew that the company was insolvent, seeing that the debenture was given in October, and that they had supplied goods up to the following January. The chairman suggested that the creditors could have obtained at Somerset House the knowledge that the company was started with a nominal capital of £3,000, of which only £800 was issued, and that a debenture for £800 was created in October, 1921. Mr. Borrodaile, on behalf of Messrs. Watshams, electrical engineers, King Street, Covent Garden, the petitioning creditors, asked whether the Official Receiver was satisfied that the debenture was issued in consideration for cash. The chairman replied that that was the fact, and Mr. Butler pointed out that he was the biggest loser by the company's failure, as, in addition to being a creditor for £126, he was the largest shareholder.—A creditor: At any rate the goods we supplied to the company on credit were sold, and the proceeds were used to pay off your debenture.—In the absence of any resolution, the liquidation was left in the hands of the Official Receiver.

Rickard, Wright & Dean, Ltd.—Winding up voluntarily. Liquidator, Mr. R. S. Dawson, Tanfield Buildings, Hustlergate, Bradford.

Blakeborough & Rhodes, Ltd.—Winding up voluntarily. Liquidator, Mr. T. R. G. Rowland, 5 and 6, Victoria Buildings, Stockton-on-Tees. Meeting of creditors, November 2nd.

Dissolutions of Partnership.—Tyne & Tees Electrical Co., electrical engineers, 23, Grange Road, Darlington.—Mr. R. Stewart and Mr. J. Drummond have dissolved partnership. Debts will be attended to by Mr. Drummond, who will continue the business under the same style.

Leng & Garrett, electrical engineers, Wheathill Terrace, Rotherham.—Mr. F. Leng and Mr. W. Garrett have dissolved partnership. Debts will be attended to by Mr. Leng, who will continue the business at 12, Godstone Road, Rotherham, under the style of F. Leng & Co.

Stockport Electrical and Mechanical Engineering Co., electrical and mechanical engineers, 276a, Buxton Road, Stockport.—Messrs. W. Sadler, J. Wager and L. Seddon have dissolved partnership. Debts will be attended to by Messrs. Sadler and Wager.

Laird & Jury, electrical engineers, Hill Cross, Coventry.—Messrs. G. A. Laird, S. S. Jury, D. Hyde, and T. H. Hyam have dissolved partnership. Debts will be attended to by Messrs. G. A. Laird, D. Hyde and T. H. Hyam, who will continue the business as Laird, Hyde & Hyam.

Trade Announcements.—Mr. T. T. D. Geesin, of 4, Clevedon Road, Penge, London, S.E.20, has recently been re-appointed London representative for Messrs. Princeps & Co., who have removed their head office to 14 and 17, Wentworth Chambers, Pinstone Street, Sheffield.

Messrs. Henry Joseph & Co. have appointed Mr. R. E. Higgin, of 265, Deansgate, Manchester, to be their agent for Lancashire, Cheshire, and the West Riding of Yorkshire, and Mr. C. E. Ridley, of 35-7, Dundas Mews, Middlesbrough, as their North-East Coast representative.

Messrs. M. J. Green, B.Sc. (Eng.) and V. Foster have entered into partnership as the General Electrical Supply Co., 144a, The Portway, West Ham, merchants and contracting engineers (with Continental goods as specialities).

The Electrical Alloy Co. has removed from 4, Regent Square, W.C., to 281, Grays Inn Road, W.C. Telephone No. and telegraphic address are unchanged.

The Reader Electrical Co., of Wakefield, has removed its business to 14, Stamp Office Road.

Messrs. Hogan Bros. & Co., 44, William Street (South), Dublin, have been appointed agents for the Irish Free State for the Holland Insulated Wire & Cable Works, of Amsterdam.

Messrs. L. P. R. Bean & Co., Ltd., of Sydney, N.S.W., desire to form trading connections with British manufacturers of domestic and general electric light and power appliances, hydro-electric and power station equipment, electric elevators, farm lighting sets, and general electrical machinery. Mr. Bean is at present making a business tour of America, England, and Europe.

Messrs. W. J. Knox & Sons, lighting and heating engineers, Railway Street, Lisburn, desire to receive manufacturers' price lists of gas and oil direct-coupled sets up to 12 kW.

Catalogues and Lists.—Messrs. Leslie McMichael, Ltd., Providence Place, West End Lane, Kilburn, N.W.6.—A profusely-illustrated catalogue giving details and prices of all kinds of wireless apparatus.

The Cambridge & Paul Instrument Co., Ltd., 45, Grosvenor Place, S.W.1.—List No. 157, illustrating and describing electrical CO_2 recording apparatus. Also a mailing card illustrating the "Omega" insulation and conductivity tester.

Mr. Charles Kratt, Ashley Street, Nottingham.—An illustrated leaflet describing the "Hastie" colour-changing electric sign.

The Tangent Tool Engineering Co., Ltd., 40-41, Great Marlborough Street, W.1.—A circular letter announcing the reduction of prices of "Tangent" tools.

Mr. Thomas T. D. Geesin, 4, Clevedon Road, Penge, S.E.20.—Publicity matter dealing with metallic packings, packing nuts, air and gas drainers, air filters, oil extractors, and steam dryers, manufactured by Messrs. Princeps & Co., Sheffield, of which firm Mr. Geeson is London representative.

British Insulated & Helsby Cables, Ltd., Helsby, near Warrington.—Pamphlet H.99, containing numerous illustrations and details of wireless aerials and accessories. Fully priced.

Messrs. Henry Joseph & Co., 96, Victoria Street, S.W.1.—A binder containing several illustrated and priced leaflets dealing with cut-outs, ceiling roses, lamp shades, vibro-massage apparatus, switches, lampholders, &c. Also a pamphlet advertising "Langham" motors.

The Wandsworth Electrical Manufacturing Co., Ltd., Ludgate Hill, Birmingham.—A list of reduced prices of switches, and revised discounts.

The General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—Folder OS.2732, giving illustrations and prices of "Osram" automobile-type lamps of various patterns.

Messrs. Frederick Thomas & Co., 189, Drummond Street, N.W.1.—A comprehensive catalogue of lighting fittings—plain and ornate—including brackets, lanterns, standards, pendants, bowls, switch-plates, &c.

Messrs. Clewerth, Wheal & Co., Ltd., Grange Engineering Works, Snows Lane, Castleton, near Manchester.—An illustrated pamphlet describing fully the "Natural" humidifier for employment in textile factories, &c.

Simplex Conduits, Ltd., Garrison Lane, Birmingham.—Two well-illustrated folders advertising "Simplex Triple-Purpose" signs.

Messrs. Charles Erith & Co., Palace Chambers, Bridge Street, S.W.1.—A well-illustrated brochure describing the construction and operation of "Riley" stokers for water-tube boilers.

The Falkirk Iron Co., Ltd., Falkirk.—An illustrated leaflet (No. 304), giving reduced prices of "No. 5,280" electric cookers.

The Midland Electric Power Installation Co., Old Mill Street, Wolverhampton.—An illustrated and priced pamphlet advertising the "Mepic" shop-window heater.

The Avamore Engineering Co., Ltd., Haslemere, Surrey.—An illustrated folder dealing with the "Squeegee" positive rotary high-speed pump and methods of driving.

The Steam Fittings Co., Ltd., West Drayton, Middlesex.—A leaflet illustrating and describing the "Union" portable gas calorimeter.

British Empire Exhibition.—The Duke of Devonshire has accepted the position of chairman of the Executive Council, and Lord Morris has been appointed a vice-president of the exhibition. Lord Morris was chairman of the provisional committee formed in 1919 to consider the question of an overseas exhibition, which, however, was eventually replaced by the present larger scheme.

For Sale.—By order of the B. D. H. Wholesale Electric Supply Co., Bournemouth (in voluntary liquidation), Messrs. Topliss & Harding will sell by auction, on October 31st, at 137, Cheapside, E.C., the stock of electrical fittings, accessories, &c. —Leicester Corporation Electricity Department has for disposal three 250-kW generating sets. (See our advertisement pages to-day.)

New Canadian Company to Sell British Electrical Goods.—During the past few months there has been formed in Canada Menzies-Smart, Ltd., which aims in part at introducing British electrical manufactures in the Western Canadian market. Mr. J. S. Menzies, head of the company (which is described as a Winnipeg firm of agricultural machinery merchants) is in this country at present. Mr. A. E. Ralph is acting as his advisory engineer. Mr. Menzies has fixed up agreements with a number of British firms for the sale of certain lines of electrical goods and the manufacture of others in Canada, particulars of which are given below. We understand that the company has been formed under the above title by a group of influential Canadian business men. The foremost object of the company is to develop a concession from the water-power branch of the Dominion Government, to provide a hydro-electric power supply at White Mud Falls, situated on the Nelson River, in the Province of Manitoba, an area of timber plantation for the supply of pulp for paper, the establishment of a pulp and paper mills, and a smelting plant for the copper mines. We give below a list of the agencies that the company has secured from manufacturers in Great Britain for the importation and sale of electrical and mechanical appliances in Canada. We are informed that arrangements have been made for the manufacture in Winnipeg of those that will call for a constant demand, and that eventually a branch works will be set up in each province:—

Berry's Electric, Ltd., for the sale of ironclad switchgear, labour-saving devices, the "Mulparvo" washing machine, and the "Ortosafe" electric iron.
The New Rotoplunge Pump Co., Ltd., for the sale of the patent "Rotoplunge," "Suddo," and "Broadway" pumps.
Erskine, Heap & Co., Ltd., for the sale of switchgear.
Johnson & Phillips, Ltd., for the sale of cables and wires, patent wiring system, connecting boxes, and transformers.
Benham & Sons, Ltd., for the manufacture and sale of their patent electric vapour heater.
The Browning Electrical Co., for the sale of its patent electric soldering irons.
The Falkirk Iron Co., Ltd., for the sale of its "Falco" cooking apparatus.
The New Compression Starter & Switchgear Co., Ltd., for the sale of lampholders and starting switches and resistances.
The Zenith Manufacturing Co., for the sale of its adjustable resistances and rheostats and vitreous enamelled resistance units.
"Welco" Patents, for the sale of their "Welconstruct" slotted steel bars and accessories and electric heating and cooking apparatus.

Unemployment.—The Secretary to the Ministry of Labour announces that the number of persons on October 16th recorded on the Live Registers of the Employment Exchanges in Great Britain as wholly unemployed was 1,332,500. This was 2,400 more than in the preceding week, and 491,233 less than the figure recorded at the beginning of last January. The number working short time and drawing benefit for intervals of unemployment was 49,700 on October 16th, as compared with 50,748 on October 9th, and 934,786 on July 1st, 1921.—*The Times.*

Wages in the Lead Industry.—The Industrial Court, in a recent award on wages in the lead manufacturing industry, has decided that the present minimum rates paid to general labourers shall be reduced by 1½d. per hour in three instalments, the first to operate in November, the second in December, and the third in January next.

The New E.C.A. Offices.—As from Wednesday last, October 25th, the offices of the following Associations (of which Mr. L. G. Tate is secretary) have removed to the Institution of Electrical Engineers' Building, Savoy Street, Victoria Embankment, W.C.2. Telephone number changed to "Regent 488"; telegraphic address unaltered, "Nafecta Phone, London":—The Electrical Contractors' Association (Inc.); the N.E.C.T.A., Ltd.; the National Federated Electrical Association; the London Electrical Masters' Association; the Joint Committee of Specialists' Association; and the National Joint Industrial Council for the Electrical Contracting Industry.

Works Costing.—The Sessional Examinations of the Institute of Cost and Works Accountants will take place on December 4th, 5th and 6th, in London, Manchester, Birmingham, Sheffield, Glasgow, and Bristol. Forms can be obtained from the Secretary, 38, Grosvenor Gardens, London, S.W., 21 days in advance of the examination.

Copper and Lead Prices.—Messrs. F. Smith & Co. report October 25th:—Copper (electrolytic) bars, £70 15s., 20s. decrease; do. do. sheets, no change; do. do. wire rods, £80 15s., 20s. decrease; do. do. h.c. wire, 10 1/16d., ¼d. decrease; silicium bronze wire, 1s. 0¾d., ¼d. decrease.

Messrs. James & Shakespeare report October 26th:—Copper bars (best selected), sheet and rods, no change; English pig lead, £28 5s., 35s. increase.

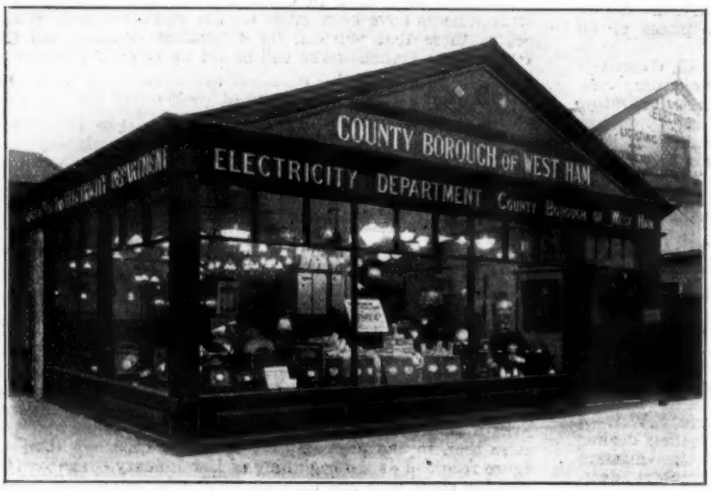
Turbo-Generating Plant Contracts.—The contracts for turbo-generating plant recently secured by Messrs. James Howden & Co., Ltd., Glasgow, include: Two 3,000-kW sets for large cotton mills abroad, ordered by the British Engineers and Traders' Syndicate, Ltd., London; two 1,000-kW high-pressure sets for Birmingham; a 1,000-kW and a 750-kW geared sets for the Carron Co.; a 1,000-kW geared set for Fleetwood; two draw-off geared sets for the Co-operative Wholesale Society, Irlam Candle Works; a geared set for a colliery in Scotland; and a geared set for Saskatchewan, Canada. A number of orders have also been booked for high-speed engine generating sets for China and Persia.

Federation of British Industries.—At a meeting of the Grand Council of the Federation of British Industries, on October 18th, Sir Eric Geddes was unanimously nominated for the post of president of the Federation during the coming year.

The Grand Council also recommended the addition to the list of vice-presidents of the Federation of the following (among others):—Col. R. K. Morcom, C.B.E., and Sir George Sutton, Bart.

These nominations will be considered next month by the annual general meeting of members of the Federation, with whom the actual election of officers rests.

New West Ham Showroom.—A conveniently-situated electrical showroom has recently been opened in Romford Road, Stratford, by the West Ham Electricity Department (engineer and manager: Mr. F. W. Purse). This is in the nature of a temporary structure owing to the uncertainty prevailing with regard to road widening in the district, but at the same time it is a handsome building, as will be seen from the accompanying view of the exterior. The builders were Messrs. C. J. Cearns, of Stratford. An attractive feature of



The New West Ham Showroom.

the front of the building is a coloured-glass "pediment," which provides a striking night display. The show consists of a large range of lighting fittings, electric fires, and a multiplicity of domestic appliances, each of which is controlled by a separate pressel switch. The showroom is immediately adjacent to the head offices and storerooms of the department.

British Trade Mark Applications.—Below we give a summary of the recent applications for British trade marks in respect of goods and productions connected with the electrical trades and industries. Firms desiring to enter an objection to any of the applications have one month in which to do so from the dates mentioned below:—

Motolite. No. 426,850. Class 6.—Dynamos. Motolite Dynamos, Ltd., Lardor Road Works, Askew Road, Shepherd's Bush, London, W. October 18th, 1922.

Kathanode. No. 425,910. Class 8.—Electric storage batteries (not for medical purposes). The "D. P." Battery Co., Ltd., Bakewell, Derbyshire. October 18th, 1922.

Oracle. No. 427,915. Class 8.—Wireless telegraphic and telephonic instruments. Winteringham, Ltd., St. Andrews Street, Northampton. October 18th, 1922.

Electric Vehicle Price Reductions.—Recent quotations show a substantial reduction in the price of electric vehicles. As this reduction has followed nearly a year behind the reduction in the price of steel and other components of the vehicle, it has been held in some quarters that manufacturers have been making undue profits, but, says the *Electric Vehicle*, those familiar with the manufacturing side of the business know that this is not true. Prices have been reduced rather to make a reasonable profit possible, by increasing the turnover. Now that the first cost has been brought to a level competitive with that of petrol vehicles of equal capacity, there should be no hesitation on the part of the buyer as to which type he will select for point-to-point transport work in urban areas. The superior economy of electric vehicles for this kind of work has been abundantly proved. How much stronger, therefore, becomes the argument for their use when the obstacle of initial cost (always appearing so formidable to the buyer) is entirely removed, or reduced to insignificant proportions.

Australian Tariff Decisions.—The following tariff decisions have been approved of by the Customs Department:—*Electrical Appliances and Material.*—Telephones (wireless) and appliances therefor. Item 189 (a), British preferential tariff, free, intermediate tariff, 5 per cent., general tariff 10 per cent. Batteries, primary and parts thereof, for use in the operation of electrical relays in power stations. Item 174, free, 5 per cent., 10 per cent. Lightning arresters, 22,000V, oxide film, 3-phase, outdoor type, complete with cut-out fuses, hook and testing stick. Item 174, free, 5 per cent., 10 per cent. *Machines, Machinery, &c.*—Rotary converters, synchronous motors, to be incorporated in X-ray apparatus manufactured within the Commonwealth. Item 404, free, free, 10 per cent. Bogie trucks, for use in the manufacture of electric tramcars. Item 174, free, 5 per cent., 10 per cent. *Stokers, mechanical.*—For burning coke breeze. Item 178 (c), 27½ per cent., 35 per cent., 40 per cent.

The Minister for Customs has decided, as a number of industries are not in a position to meet the requirements of Australia, to defer the duties on paper-insulated and lead-covered telegraph and telephone cables until January 1st.—*Reuter's Trade Service* (Melbourne).

Local Exhibitions.—It is proposed to hold an "ideal homes exhibition in Dundee early next year.

The recent fire at the Cirences.r power station necessitated the closing two days before the intended date of an electrical exhibition organised by Messrs. Edwards & Armstrong, Ltd., who have a branch in the town. The exhibition, which opened on October 2nd, contained numerous examples of domestic electrical appliances, lighting fittings, and industrial apparatus, one feature being a "Lister-Bruston" lighting set in operation. The show was held in a large garage, part of which was rented for the purpose.

The Worksop electrical exhibition, which concluded on October 23rd, was a pronounced success. Mr. J. Percival Crowther, A.M.I.E.E., said, at the opening ceremony, that the exhibition was due to the progressiveness of the Worksop electrical contractors and several well-known manufacturers. The exhibition included a large variety of electrical appliances, including wireless sets, cigar lighters, electric washers, motor horns, cookers, and advertising devices. The receipt of wireless messages attracted a good deal of attention. Among the novelties was a bedroom light which reflected a clock's face on to the ceiling. Pedestal electric heaters, gasfilled lamps, "Dimalite" adapters, and "Doriclite" fittings were also on view, and many visitors were particularly interested in the "Klaxonet" horn. The large consumption of current has prevented many motorists from having a "Klaxon" fitted to their cars, but the Klaxonet consumes little current, and the note has been improved.

Trade and Wages.—The inaugural address delivered yesterday by Mr. Atholl Blair, the chairman of the Belfast Association of Engineers, was on the subject of "Trade and Wages."

Book Notices.—"Direction and Position Finding by Wireless," by R. Keen. Pp. xvi+376; figs. 254. Price 9s. "The Wireless Telephone—What it is and how it works," by P. R. Coursey. Pp. vi+112; 49 figs. Price 2s. 6d. "Masts and Aerial Construction for Amateurs," by F. J. Ainsley. Pp. viii+82; figs. 65. Price 1s. 6d. net. "Crystal Receivers for Broadcast Reception," by P. W. Harriss. Pp. viii+74; figs. 75. Price 1s. 6d. "The Perry Auto-Time Morse System," by F. W. Perry. Pp. xvi. Price 6d. London: The Wireless Press, Ltd.

"Wireless Telephony for All," by L. M. Cockaday. Pp. xii+211; 65 figs. London: H. Jenkins, Ltd. Price 5s. net.

"Engineering Abstracts," new series, No. 13, October, 1922. London: The Institution of Civil Engineers.

"M. & C. Machine Mining," October. Glasgow: Mavor and Coulson, Ltd.—This issue contains several useful articles upon coal-cutting and transporting machinery, including "Face Conveyors and Gate-end Loaders," and an interesting comparison of old and new mining methods.

"Moving Picture Projection," by J. Slater. Pp. xxviii+165; 34 figs. London: Bioscope Publishing Co., Ltd. Price 5s. 4d., post free.

Journal of the American Institute of Electrical Engineers. Vol. XLI. No. 10. October, 1922. New York: The Institute. Price $1.

Ilford Super Kinema.—When describing the above-named kinema last week it was stated that "Two Kershaw projectors by the Sun-Light Arc Corporation are installed." We understand that Messrs. Duncan Watson & Co. are the sole European concessionaires for the "Sun-Light" arc high-intensity projection lamps used with this apparatus.

New French Company.—La Société Hydro-Electrique de la Cere is the name of a new undertaking which has lately been formed in Paris (79, Rue de Monceau), with a capital of 20,000,000 fr.

Textile Mill Electrification.—The first meeting of the session of the Paisley Association of Engineers was held on October 10th, when Mr. R. W. Dodson delivered his presidential address, taking as his subject "The Electric Driving of Textile Mills." Mr. Dodson pointed to the many advantages to be gained by textile-mill electrification, and instanced cases where the production had been considerably increased by this means. Motors specially designed for this work had shown remarkable efficiency, and an example was quoted of a machine which had given an overall efficiency of 88 per cent. on a load varying from 50 to 200 per cent. of its rating.

Electricity in Advertising.—In a lecture bearing the above title delivered at the Publicity Club of London, Mr. Ernest Morison, manager, Outdoor Publicity, Ltd., gave an interesting review of the history of advertising by electrical methods. He incidentally provided proof of the adage "There is nothing new under the sun," and showed that many present-day developments which were claimed to be innovations had their forerunners as far back as thirty or forty years ago, although in many instances these had been forgotten. He recalled that football matches were played by electric light in Hull in 1883, and two years later Mr. J. Morley brought out a form of flood-lighting. The forming of various combinations of electric lamps by means of a "typewriter" switching apparatus dated back to 1891, the system having been introduced by a Mr. Champion. The years 1896-1900 saw many developments in electrically-operated signs, including the two-colour sign which was now so frequently seen. Mr. Seabrook brought out the first thermal sign flasher in 1904, and about that time Mr. Poulton, of the Electric Sign Co., invented the "wiping" method of switching on signs, so surmounting the police objection to the amount of light to be shown at once. Mr. Morison concluded by a reference to the scintillating sign in Shaftesbury Avenue, which he considered to be the most up-to-date example of this form of publicity.

LIGHTING AND POWER NOTES.

Accrington.—Extension of Supply.—The Electricity Commissioners have empowered the Corporation to proceed with the laying of a cable to supply electricity to the area of the Oswaldtwistle District Council without waiting for the sanction of Parliament.

Ambleside.—Electricity Charges.—The Windermere and District Electricity Supply Co. has applied to the Ministry of Transport for an order to charge 1s. per kWh, with minimum payments of 15s. for the winter quarters and 10s. for the summer quarters.

Ashford.—Electricity Supply Scheme.—The Council has retained Messrs. May & Hawes as consulting engineers to prepare a scheme for an electricity supply undertaking for the district.

Australia.—Tasmania.—The Treasurer, Sir Neil Lewis, said in his Budget statement that the hydro-electric department was rapidly expanding, there being an increase in the revenue of £36,364, with a net surplus for the year of £23,872. With the new enterprises that had been established in active operation, and with the healthy outlook in most of the primary industries of the State, there was every prospect of prosperous times ahead.—*Reuter* (Hobart).

Brisbane.—A project has been formulated for an electric lighting scheme in the suburbs of Windsor and Toomoul, to cost £45,000. The Minister for Works is urging the municipalities concerned to endeavour to finance the scheme themselves. The Government has also suggested that a larger project, embracing several contiguous areas, should be entered upon, the new scheme to cost £100,000. The whole matter is as yet in abeyance.—*Reuter's Trade Service* (Melbourne).

Bolton.—Price Reduction.—The Electricity Committee has decided to reduce the charges for electricity by 0.1d. per kWh for both lighting and power purposes, the reduction to come into effect as from the beginning of the March quarter, 1923.

Bury.—Revision of Charges.—The Electricity Committee has decided that as from October 1st the following charges shall be made for electricity in lieu of those previously in force, viz.:—Lighting: offices, &c., 6d. per kWh; shops, 5½d.; hotels and private houses, 4½d. Power: for first 4,000 kWh., 3d. per kWh.; next 1,000, 1.5d. per kWh; next 190,000, 1d.; all above, .8d.; tramways, 1.5d.

Canada.—Winnipeg.—The Winnipeg branch of the Canadian Manufacturers' Association has proposed to the City Council that instead of proceeding with the projected steam stand-by plant of 15,000-h.p. capacity, costing $1,500,000, it should endeavour to come to terms with the Winnipeg Electric Railway Co., which already has a steam stand-by plant which, it is considered, could also serve the city.

Export of Energy.—The total amount of electrical power exported from Canada to the United States during the fiscal year ended March 31st, 1922, was 861,567,183 kW, being a decrease of 157,996,828 kWh as compared with the previous year.—*Electrical News.*

Toronto.—The recently-published report of the Toronto Electric Commissioners for the year 1921 records a total income of $3,622,605, an increase of 15 per cent. Operating and management costs amounted to $1,101,355 and cost of purchased energy $1,111,019, as against $988,748 and $974,828 respectively in the preceding year. The gross surplus was thus $1,410,231. Interest, taxes, and other capital charges absorbed $206,913, leaving a net profit of $214,353. The amount of energy sold rose from 214,908,545 to 221,384,558 kWh and the connected load from 194,800 to 227,600 h.p.

Cannock.—Tariffs.—In connection with the electricity supply scheme that was inaugurated on the 12th inst., for the time being the Council intends to charge at the rate of 7d. per kWh for lighting and 2d. for heating on a flat-rate system, but it also offers an alternative system, under which consumers would be charged upon the basis of 15 per cent. per annum, payable quarterly, upon the rateable value of the property supplied, plus a charge of 2d. for each and every kWh consumed. For hotels, shops, offices, &c., requiring supplies for lighting, heating, cooking, and other purposes, the Council, in addition to the flat rate referred to above, offers as an alternative the maximum demand system under which consumers would be charged at the rate of £2 10s per quarter per kW of maximum demand, plus 2d. per kWh. For ordinary power purposes the charge will be at the rate of £2 per quarter per kW of maximum demand, plus 1d. per kWh, subject to discounts varying from 5 per cent. up to 20 per cent., according to the demand made. Special terms are granted to large consumers, such as collieries, engineering works, &c., which are the subject of special agreements.

Cardiff.—Extension of Supply.—The Electricity Committee has decided to extend its area of supply to include Mynachday, at a cost of £1,035. The city engineer and the electrical engineer have been requested to submit a report as to the advisability of extending the mains to the Ely housing site.

Corea.—Seoul.—H.M. Consul-General at Seoul has informed the Department of Overseas Trade that the Kongosan (Diamond Mountains) Electric Railway Co. has obtained official permission to supply electricity to Seoul, and it is hoped to commence the supply in September of next year. The generating station of the company, in which 32,000 kW of plant is to be installed, is nearing completion. The station is situated at Chudairi, Kogen Province, a distance of 62 miles from Tetsugen (Corean, Cholwon), a station on the Seoul-Gensan railway, which is to be the terminus of the line; from Tetsugen to Seoul the distance is about 61 miles, so that electricity will have to be transmitted a distance of over 120 miles in all. The total cost of the transmission line is estimated at nearly 4,000,000 yen.

Crompton.—Special Order.—The Urban District Council has applied to the Electricity Commissioners for a Special Order authorising it to supply electricity within the district, and to obtain a bulk supply from Oldham Corporation.

Dolgelly.—Water-power Scheme.—The Urban Council has under consideration three schemes submitted for the utilisation of the cataracts in the district for generating electricity.

Edinburgh.—Year's Working.—The accounts of the City electricity undertaking (engineer: Mr. F. A. Newington) for the year ended May 15th, 1922, show a total income from all sources of £395,091, as compared with £314,669 in the previous year. Working expenses remained at about the same level, being £242,512, as against £241,054. The gross profit was thus £152,579, as compared with £73,615. Although there was a considerable increase in capital charges, the result was a net profit of £30,714, contrasting favourably with a deficit of £963 in 1920-21. A total of £500,416 was spent on capital account during the year, the largest items being: Portobello station (land, buildings, and machinery), £292,312; mains and transformers, £126,192; and sub-station land, buildings and plant, £49,376. Energy sales showed the appreciable increase of 4,308,196 kWh, with a total of 33,935,455 kWh.

Electricity District.—South-East Lancashire.—The Board, at its meeting on October 17th, approved of the installation of a further 150-kW set by the Alderley and Wilmslow Electric Supply Co., Ltd. A proposed contract between the Manchester Corporation and the Stretford Urban District Council was approved, whereby the Corporation will furnish, for a period of seven years, bulk supplies to the Council, the maximum demand to be 10,000 kW, the supply to be given from Barton. The Board has issued to the constituent authorities an exhaustive *questionnaire* requesting information to enable it to deal with the question of running hours.

Emley (Yorks.).—Electricity Supply.—A ratepayers' meeting has decided in favour of electricity being installed in the village.

Faversham.—Electricity Charges.—The Town Council has applied to the Electricity Commissioners for an Order fixing the maximum charge for electricity for lighting at 1s. per kWh.

Loan Sanctioned.—The Council has received sanction to a loan of £801 for mains.

Huddersfield.—Loan Sanctioned.—The Corporation has received sanction to borrow £16,000 for electricity purposes.

India.—Upper India.—*Indian Engineering* states that considerable developments are reported in connection with the utilisation of electric power in Upper India. The Indian Electric Supply & Traction Co., Ltd., Cawnpore, whose fine new power house on the banks of the Ganges at Cawnpore is being set to work, has found it necessary to extend already. In addition to the two 4,500-h.p. steam turbo-generators now being started, this company is ordering two 9,000-h.p. generating sets, together with the necessary boiler and electrical equipment. This power house is the largest and most up-to-date in Upper India. It is understood that Rai Bahadur Sir Ganga Ram, Kt., C.I.E., M.V.O., of Lahore, has placed orders in England for a large power house at Renala, Punjab, for the utilisation of hydro-electric power from the Lower Bari Doab canal for irrigation purposes. The Punjab Government Irrigation Department has recently ordered a large number of electric pumps in connection with the Sutlej weir works. It is interesting to note that the orders for the whole of the Cawnpore plant, for the power house electrical plant at Renala, and for the electric pumps for the Sutlej, have been placed with the English Electric Co., Ltd.

Jersey.—Proposed Electricity Supply.—The Jersey Gas Light Co., Ltd., has lodged a Bill with the States for powers to supply electricity for private and public purposes in Jersey. The memorial for the Bill embodies the scheme and plans which the company's consulting engineers (Messrs. May and Hawes, Westminster), have prepared, and undertakes to give a supply of electricity within 18 months. The scheme is practically the same as that which the company's engineers got out just prior to the war, the system of supply being the d.c. three-wire system at pressures of 240 and 480 volts. The power station will be erected on a site already in possession of the company, almost centrally situated in the supply area, and a comprehensive list of underground mains has been drawn up for the initial scheme.

Keighley.—Bulk Supply.—A special meeting of the Town Council is to be held to consider a recommendation of the Electricity Committee with regard to the supply of electricity to Skipton. The committee has recommended that, subject to powers being obtained, an agreement be entered into with the Yorkshire Electric Power Co. for an e.h.p. supply of electricity in bulk.

Luton.—Loan.—The Town Council has applied for a loan of £5,209 for a 1,000-kW rotary converter, with transformer, switchgear, &c.

Lees (Lancs.).—Electricity Scheme.—The Urban District Council has applied to the Electricity Commissioners for a Special Order authorising it to supply electricity within the district.

Northwood.—Price Reduction.—The Northwood Electric Light & Power Co., Ltd., has reduced the charge for electricity for heating and cooking from 3d. to 2d. per kWh.

Radcliffe.—Loan Sanctioned.—The District Council has received sanction from the Electricity Commissioners to the borrowing of £22,769 for electricity purposes.

Bulk Supply.—The chairman of the Electricity Committee reports that the agreement between the Council and the Lancashire Electric Power Co. for a bulk supply of electricity has been sealed, and that electricity will be supplied from January 1st.

Royton.—Electricity Scheme.—The Urban District Council has applied to the Electricity Commissioners for a Special Order authorising it to supply electricity within the district.

Southend-on-Sea.—Loan Sanctioned.—The Town Council has received sanction to a loan of £15,000 for house services.

Skegness.—Electricity Supply.—The Urban Council has received an application by a firm for permission to supply electricity to the town for public purposes, and the matter has been referred for consideration to the General Purposes Committee.

Spalding.—Plant at the Gasworks.—The Urban District Council has decided to obtain the report of an expert on the question of installing an electrical plant at the gasworks, the two systems to be worked in conjunction with each other.

Weston-super-Mare.—Street Lighting.—After a spirited debate upon the respective merits of gas and electricity for street lighting, the Urban District Council agreed on October 11th to accept the tender of the Weston-super-Mare and District Electric Supply Co., Ltd., for a contract to light electrically a number of the principal streets for a period of five years. It had been agreed by a committee that the remainder of the district should be lighted by the local gas company, but an amendment proposing the referring back to Committee of this question was carried and embodied in the main resolution.

Willesden.—Year's Working.—The report and accounts of the Council's electricity undertaking (engineer: Mr. A. W. Blake) for the year ended March 31st last, show a total income of £101,967, comparing with £100,231 in the preceding year. Working expenses amounted to £74,112, as against £72,927, leaving a gross profit of £27,855 (£27,304). After crediting bank interest, &c., and deducting capital and other charges, a net profit of £3,153 remained. In the previous year the net profit was £4,503. The energy purchased from the North Metropolitan Electric Power Supply Co. amounted to 9,725,020 kWh, as against 9,537,290 kWh in 1920-21. The sales, however, fell from 8,362,787 to 8,160,940 kWh. During the year a 500-kW rotary converter was installed at Salusbury Road, and eventually removed to the Acton Lane sub-station. Twenty-five miles of cable was laid and 588 new services provided.

Windsor.—Electricity Charges.—The Electrical Installation Co., Ltd., has applied to the Ministry of Transport for an Order authorising the continued charge of a maximum of 1s. per kWh, with minimum payments during the winter quarters of 15s. per quarter, and during the summer quarters of 10s.

TRAMWAY AND RAILWAY NOTES.

Aberdeen.—Tramcar Improvements.—The Corporation has decided that 23 tramcars specially designed on the "pay-as-you-enter" system be altered and remodelled to the newer standard type at a cost of £3,450.

Argentina.—Railway Electrification.—The electrification of the suburban section of the Buenos Aires Western Railway between Plaza Once and Moreno is now well advanced. The company has recently been running trial trains over the section with the object of giving preliminary practice to the drivers, guards, and other *personnel*, and also to test the track and rolling stock. The results so far have been satisfactory. It is hoped that the electrified section will be opened to public service before the end of the year.—*Review of the River Plate.*

Bolton.—New Routes.—With a view to the relief of unemployment during the winter, the Tramways Committee has decided to apply to the Government Unemployment Grants Committee for assistance in the scheme, estimated to cost £43,000, for making five extensions to the tramways, as follows:—Chorley Old Road, from the terminus to Midge Hole Lane. Brownlow Fold, from the terminus, Eskrick Street, along Elgin Street and Church Road to Harpers Lane; Great Lever, from Bridgman Street to Higher Swan Lane; Salisbury Street and Shiffnall Street, for convenience of working at the tram sheds.

Reduced Fares.—The Tramways Committee has decided to restore the pre-war fares throughout the day until 6.30 in the evening, the higher fares being charged after that time, after 1.30 on Saturday afternoon, and on Sundays.

Bradford.—Track Renewals.—The Ministry of Transport has sanctioned the borrowing of £90,593 in respect of part of the cost of reconstructing the following sections of the tramways, *viz.*:—Barkerend Road (Byron Street to Rushton Road); Forster Square, Lidget Green (Tyrrel Street to Listerhills Road); Little Horton (Holm Top Lane to Southfield Lane); Manchester Road (Bentley Fold to Pearson Road); and Thornton (Godfrey Street to Allerton Road).

New Railless Car.—The municipal tramway authorities have recently constructed in their own works at Thornbury a special six-wheel railless car, with which experiments are at present being conducted.

Edinburgh.—Electrification of System.—Cable cars ceased to run along Princes Street last Saturday, and on Sunday morning electric cars were running on the ordinary service.

Extension of Route.—The Corporation Sub-Committee has recommended an extension of the Liberton route at a cost of £15,320.

London.—"Underground" Developments.—In addition to the new works which are under construction at Golders Green in connection with the Hendon and Edgware extension, the reconstruction of the City and South London Railway, and the linking-up of that line with the Hampstead tube, the Underground railways have large development schemes pending for continuing the Piccadilly tube beyond Hammersmith and linking up this line with Richmond and Hounslow, thus providing a through service of trains between these districts and the West End. Many improvements for facilitating heavy

traffic at some of the more important traffic centres are under consideration. Westminster station is to be practically rebuilt, escalators are to be installed at Tottenham Court Road, Bank, Shepherd's Bush, and Bond Street, and the escalator equipment at Oxford Circus is to be improved. At all these stations the booking office arrangements are to be reorganised and new equipment provided in the shape of electric change-giving machines with a view of relieving congestion by speeding up the traffic between the street and the platform.

L.C.C. Tramway Department.—The Highways Committee of the London County Council reports that, owing to adjustments of wages in the tramway department, the following savings will be effected:—Transport workers, present financial year, £62,000, and in subsequent years about £124,000; engineering (mechanical), present year, £84, subsequent years £152; coach trades, present year £2,970, each subsequent year £5,150.—*Financial Times.*

Oldnam.—Year's Working.—The annual report of the general manager of the Corporation tramways (Mr. W. Chamberlain) for the year ended March 25th last, shows that the total income was £253,883, as compared with £250,742 in the preceding year. The total working expenditure was £200,503, as against £202,235, leaving a gross balance of £53,380 (£48,507). After crediting interest, &c., and deducting capital charges, a balance of £16,723 was carried to the appropriation account, a result which compared favourably with the 1920-21 net profit of £5,065. The whole of the profit was transferred to the reserve for renewals, which, at the end of the year, stood at £35,632. The capital expenditure during the year amounted to only £15. The Parcels Department showed a profit of £322, as compared with a deficit of £260 in 1920-21. The car-mileage increased from 2,202,868 to 2,460,699. The percentage of working expenses to receipts fell from 80.65 to 78.97, and the average traffic revenue from 26.760d. to 24.273d. per car-mile.

United States.—New Railway.—An application was filed with the Interstate Commerce Commission recently by the Staley system of electrified railroads for permission to build a 950-mile line in Colorado, New Mexico, and Arizona, with 225 miles of branch lines. The projected road is to start at the Mexican border in Prima County, Arizona, and run northward through the San Juan basin.—*Reuter's Trade Service* (Washington).

TELEGRAPH AND TELEPHONE NOTES.

Argentina.—Telephone Tariff.—Telegraphic advice has been received by the United River Plate Telephone Co. that the increase in its tariff, applied for in 1919, has been granted by the President.—*Financial Times.*

Australia.—Automatic Telephones.—The Federal Public Works Committee has recommended the erection of a six-storeyed automatic telephone exchange at Sydney with a capacity of 16,000 lines, at an estimated cost of £404,000.—*Reuter's Trade Service* (Melbourne).

Canada.—New Wireless Station.—The Canadian Marconi Co., in co-operation with the English company, has applied to the Government for a licence to erect at Vancouver a powerful wireless station, at a cost of $2,000,000, to give direct communication between Australia and the east coast.—*Financial Times.*

Germany.—Valve Thefts.—A Berlin engineer, two physicists, and a mechanic have been arrested on the charge of having obtained patented wireless transmission valves belonging to the Telefunken Co., and sold them abroad. The company is stated to have found its valves in use in stations situated in the United States, Holland, and the Russian border States. The persons arrested are said to have confessed, and have been released on bail pending prosecution.—*The Times.*

Japan.—Wireless Developments.—In order to develop the radio art on a large scale in Japan, a plan has been submitted to Premier Kato and is said to have received his approval. The co-operation of the Minister of Communications is also to be secured. The plan is supported by leading financiers of Japan, and contemplates the formation of a company capitalised at 200,000,000 yen, along the lines of the large radio enterprises in other countries. It is understood that the Japanese Government favours in principle the retention of all kinds of communication in the hands of the Government. The first step will be the formulation of plans for a high-power radio station consisting of several units, designed for direct communication with the United States and with various Asiatic countries. The company will manufacture its own apparatus and will eventually enter the export field. It has already secured the consent of Marconi's Wireless Telegraph Co., Ltd., the Radio Corporation of America, the Compagnie Française de Télégraphie sans Fil, and the Gesellschaft für Drahtlose Telegraphie to its inclusion in the working agreements made among these four radio companies.—*Commerce Reports.*

Poland.—New Radio Station.—Preliminary tests are being carried out this month between New York and Poland in connection with the new radio telegraph station that is being erected at Warsaw by the Radio Corporation of America for the Polish Government.—*T. & T. Age.*

The Telephone Service.—New Exchanges.—The following new Liverpool and district telephone exchanges are to be opened to replace existing exchanges:—Birkenhead, Ellesmere Port, Formby, Frodsham, Garston, Hoylake, Lark Lane, Newton-le-Willows, Old Swan, Phonogram Exchange, Rock Ferry, Royal (new exchange in same building), St. Helens, Walton, Warrington, Waterloo, and Widness. Exchanges in the following districts, at present undeveloped, will be undertaken provided sufficient support is obtained:—Thornton Hough, Halewood, Kirkby, Union Mills (I. of M.), Crosby (I. of M.), Kirk Michael (I. of M.), Ballaugh (I. of M.), and Sulby (I. of M.). Extension to present equipment is in hand at Anfield, Bootle, Central Grappenhall, Helsby, and Warrington. The exchange equipment at the Bank Exchange has been increased by 280 lines. The new exchange at Fleetwood, which was opened on July 15th last, is the first public exchange to be installed on the "Relay" automatic system. We hope to publish details of the equipment next week.

United States.—Wireless Telegraphy.—The American Press has been giving prominent notices in its columns of the traffic arrangements recently concluded between the Postal Telegraph and Cable Co. and the Radio Corporation of America, both United States corporations, whereby the former agrees to accept for transmission at all its offices messages to Europe, Asia, &c., marked "*Via* R. C. A.," this route indication meaning that the messages are to be transmitted by the trans-Atlantic wireless routes operated by the Radio Corporation at New York to Great Britain, Germany, France, Norway, and also other countries with which direct wireless services may in the future exist. Mr. Clarence H. Mackay, president of the Postal Telegraph and Cable Co., in his announcements, refers to arrangements his company has with the Telefunken Co. of Germany, securing the right to purchase all the high-powered radio apparatus necessary to establish additional radio stations in the United States. This, he added, also carries with it the right to a proportion of the wireless traffic out of Germany and for the exchange of radio messages with Telefunken stations in all parts of the world. This is a remarkable change of front, for, in the Mackay Co.'s reports "Wireless" was generally regarded lightly and referred to as suitable only for ship-and-shore work.

It is interesting to watch the re-grouping of telegraph interests, for, since the opening for traffic of the Miami-Barbados cable, the Western Telegraph Co., an associate company of the Eastern Telegraph Co., has been running in joint effort with the Western Union Co., and this has undoubtedly made more mutual the interests of the All-America Cables, Radio Corporation of America, Postal Telegraph & Cable Co., and the Commercial Cable Co., as well as European wireless undertakings. It remains to be seen how far the French cable interests and the interests of the Imperial cables will be benefited by a closer association with one or the other interests. It will be interesting to watch progress and developments.

Wireless Telephony.—The "Phono-Phane."—The Hon. Edward Fallows, a member of the United States Congress and president of the Hutchinson Radio Co., of America and Canada, arrived at Southampton from the U.S.A. to-day. He was to bring with him the "Phono-Phane," an instrument that is regarded as being "one of the greatest discoveries in radio detection of the day." The chairman of the Hutchinson Co. is Dr. Miller Hutchinson, the inventor of the Klaxon horn, the Acousticon, the Dictograph, and the Speedmeter. Mr. Fallows was also to bring a new radio set, which is remarkable for its small size. He has come to this country in order to negotiate with electrical companies in England.

Air Ministry Regulation.—The Air Ministry has decided that all civil aircraft making journeys of over 100 miles must be fitted with wireless apparatus. All British machines on the regular air routes have for some time past been fitted with wireless. The new ruling means that all machines used for special flights of over 100 miles will be similarly equipped. The order is another of the series made in the interests of safety as a result of frequent conferences between Air Ministry officials and pilots and officials of the air lines.—*Evening News.*

Yap.—New Wireless Station.—In the next budget of the Governor-General of the South Sea Islands there will be an item of 1,200,000 yen to cover the construction of a high-power radio station in the island of Yap, included in the South Sea Islands group over which Japan was given a mandate by the League of Nations. Under the provisions of the treaty concluded at Washington, the United States was granted equal rights with Japan as regards the maintenance of radio and cable stations on the island, which previous to the war was a landing point for the German-Dutch cables. These cables are now operated jointly for the benefit of the five principal Allied and Associated powers, and form a direct connection with the commercial Pacific cable for business between the United States and the Dutch East Indies.—*Commerce Reports.*

CONTRACTS OPEN AND CLOSED.

(The date given in parentheses at the end of the paragraph indicates the issue of the Electrical Review *in which the "Official Notice" appeared.)*

OPEN.

Aberdeen.—November 10th. Electricity Department. One 10,000-kW turbo-alternator, with surface condenser and auxiliaries. (October 20th.)

Australia.—Melbourne.—Postmaster-General's Department. November 16th. Insulated signal cable (Sched. 958).
November 21st. Switchboard parts (Sched. 67).
December 12th. 1,416 switchboards (Sched. V68). (See October 20th.)
January 10th, 1923. Telegraph power plant (Sched. W.A. 647). (October 20th.)
Victorian Railways. November 29th. One industrial electric storage battery truck (4,000 lb. carrying capacity).*
January 24th, 1923. Fifty miles insulated copper wire.—*Reuter's Trade Service* (Melbourne).
January 19th, 1923. Electricity Commissioners. Steam turbine-driven boiler-feed pumps (Spec. 23/4) for the Morwell power scheme. (October 20th.)

Belgium.—November 8th. Belgian Telegraph and Telephone authorities, La Salle Madeleine, Brussels. Telegraph cable and wire, insulators, and other material.

Birmingham.—November 27th. Electric Supply Department. E.h.p. switch panels, &c. (October 20th.)

Bristol.—November 14th. Electricity Department. One 4,000-kVA single-phase turbo-alternator with condensing plant. (October 20th.)

Dublin.—November 6th. Irish Postmaster-General's Department. 14,000 Leclanché cells, 3,500 dry cells, 8 tons chloride of ammonia, 40,000 Leclanché zinc rods, 3,500 Leclanché glass cells. (October 13th.)
November 14th. 90 tons h.d. copper wire, 25 tons bronze wire, 70 tons g.i. wire. (See this issue.)
November 13th. Great Northern Railway (Ireland). Stores for six months, including electrical fittings and lamps, electric cable and wire, &c. (See this issue.)

Edinburgh.—November 1st. Tramways Department. Supply, &c., of one 20/25 h.p. motor tower wagon.
November 14th. Eight automatic point controllers and 56 top-covered car bodies.

India.—November 3rd. High Commissioner for India. Electric jib crane and overhead electric crane. Director-General, Stores Department, 11, Belvedere Road, S.E.
November 17th. D.c., l.p. two and three-core cables. (See this issue.)

Leeds.—November 10th. Electricity Department. Iron castings for 6 or 12 months. (October 20th.)

London.—London County Council.—November 6th. Control panel and switchgear connections for No. 4 generator at Greenwich power station. (October 13th.)

Madagascar.—December 20th. Posts and Telegraphs Department. Copper and bronze wire; insulators, brackets, bolts, &c.; cable, covered wire, &c. Agence Economique de Madagascar, 40, Rue du Général-Foy, Paris.

Neath.—Rural District Council Electricity Department. One 1,000-kW turbo-alternator, with condensing plant, foundations, switchgear, &c. (October 13th.)

New Zealand.—Wellington.—December 5th. Telephone system for the Mangahao power house and sub-stations, &c.*
Dunedin.—December 8th. City Council. One 150-h.p. 3-phase motor and reduction gear for the Mornington cable tramway system.*

Rochdale.—November 1st. Board of Guardians. Electric lift, &c., at Birch Hill, Dearnley. (October 13th.)

South Africa. — Pretoria.—November 23rd. Municipal Council. H.p. and l.p. switchgear, transformers, and cables in connection with the extension of the electric light and power supply.*

South Shields.—November 15th. Electricity Department. Two water-tube boilers with mechanical stokers, economisers, induced draught plant, and steel chimney, also ash-handling plant and extension to boiler-house. (October 20th.)

Stoke-on-Trent.—November 15th. Electricity Department. Mains and cables for 12 months. (See this issue.)

Torquay. — November 4th. Electricity Department. E.h.p. switchgear for Newton Abbot power station and main sub-station at Torquay. (October 20th.)

Warrington.—November 13th. Electricity Department. H. and l.p. paper and lead-covered cable. (October 20th.)

*A copy of the plan, specification, and conditions of tender, &c., can be inspected at the Department of Overseas Trade (Room 84), 35, Old Queen Street, S.W.1.

Wicklow.—November 4th. Urban District Council. Semi-Diesel engines and dynamos, booster, switchboard battery, overhead mains, house services. Messrs. J. P. Tierney and Co., consulting engineers, 44, Kildare Street, Dublin.

York.—November 21st. North-Eastern Railway Co. Telegraph apparatus and telegraph wire and line stores for six months. (See this issue.)

CLOSED.

Douglas.—Corporation. Accepted:—
Erection of power station (£7,500).—Creer Bros. The tender was the lowest of the six sent in.

Dover.—Mr. E. A. Pinto, of Dover, has obtained the contract for electric lighting installation at the Customs and Excise Department, Dover.

Glasgow.—Tramways Committee. Recommended:—
Copper trolley wire.—R. Johnson & Nephew, Ltd.
Copper rail bonds.—British Insulated & Helsby Cables, Ltd.
Bell pushes.—W. C. Yuille & Co., Ltd.
Fluted brass rollers.—C. Henderson & Co., Ltd.
Bond plugs.—J. Stewart & Co., Ltd.
Ratchet braces.—Dempster, Moore & Co., Ltd.

London.—London County Council. Highways Committee. H.p. switchgear for the Central Repair Depôt.

Johnson & Phillips, Ltd. (accepted)	**£1,071**
Ferguson, Pailin, Ltd.	1,125
A. Reyrolle & Co., Ltd.	1,530
General Electric Co., Ltd.	1,570
Park Royal Eng. Works, Ltd.	1,619
British Thomson-Houston Co., Ltd.	1,742
Metro.-Vickers Electl. Co., Ltd., Trafford Park, Manchester	2,008
Switchgear & Cowans, Ltd.	2,146
Bertram Thomas	2,146

Marine-type boilers, with mechanical stokers, for Central Repair Depôt.

S. Hodge & Sons, Ltd.	£2,550
Davy Bros., Ltd. (accepted)	**2,565**
Clayton, Son & Co., Ltd.	2,942

Four electric lifts for Central Repair Depôt.

†British Steel & Iron Exporters, Ltd.	£1,694
Holt & Willetts (accepted)	**1,838**
Keighley Electl. Eng. Co., Ltd.	1,970
S. H. Heywood & Co., Ltd.	2,109
R. A. Evans, Ltd.	2,205
Etchells, Congdon & Muir, Ltd.	2,217
Pickerings, Ltd.	2,347
Wm. Wadsworth & Sons, Ltd.	2,350
Medways' Safety Lift Co., Ltd.	2,360
Hoisting Appliance Co.	2,399
Aldous & Campbell, Ltd.	2,560
Hill & Sons	2,695
Reliance Lift & Eng. Co., Ltd.	2,795
Ditto ditto (alternative)	3,076
Express Lift Co., Ltd.	2,817
Waygood-Otis, Ltd.	2,866
Marryat & Scott, Ltd.	2,899
A. & P. Steven	2,990
John Bennie, Ltd.	3,110
Higginbottom & Mannock, Ltd.	3,250
London Hoist & Machinery Co.	4,565

† Not to specification.

Metropolitan Asylums Board. Accepted:—
Installation of generating set, switchboard, &c., at Highwood Institution.

Peter Brotherhood, Ltd.	£224
J. H. Holmes & Co., Ltd. (accepted)	**240**
J. Crompton & Co., Ltd.	242
Aster Eng. Co., Ltd.	251
J. H. Holmes & Co., Ltd. (alternative)	251
Aster Eng. Co., Ltd. (alternative)	260
Elec. Construction Co., Ltd.	275
Petter Oil Engine Co., Ltd.	285
Austin Motor Co., Ltd.	294
Sunderland Forge Co., Ltd.	325

Hackney.—Electricity Committee. Recommended:—
Electric lorry, with hand-tipping body (£800).—Garrett & Sons, Ltd.

Hammersmith.—Electricity Committee. Recommended:—
Stairways, platforms, &c., to the two additional boilers under the extension scheme (£256).—Foster Construction Co., Ltd.
1,000 yd. .05 l.p. cable (£159).—Hackbridge Cable Co., Ltd.

Richmond-on-Thames.—Town Council. Accepted:—
Electrically-driven booster pump (£130).—Worthington-Simpson, Ltd.

Rishton.—Urban District Council. Accepted:—
Electricity distributing station, subject to the approval of the Blackburn Electricity Committee.—Messrs. J. Highton & Sons, Blackburn.

Salford.—Tramways Committee. Accepted:—
Stores for six months.
Lamps.—English Electric & Siemens Supplies, Ltd.; British Insulated and Helsby Cables, Ltd.
Gear wheels.—Met.-Vickers Electrical Co., Ltd.; British Hele-Shaw Patent Clutch Co., Ltd.
Steel tires.—Brown Bayley's Steel Works, Ltd.

Wolverhampton.—Town Council. Accepted:—
Reconstruction of the tramway between Balfour Crescent and the Wergs (£14,617).—M. A. Boswell.

New Swedish Electric Welding System.—A demonstration of the system of electric welding by alternating current invented by the engineer, M. Toernbloem, which has been called the Wex system, was recently given in the presence of representatives of the Press. Foreign countries are said to be displaying great interest in the invention.—*Reuter's Trade Service* (Stockholm).

FRANK GILL, O.B.E., M.I.E.E., M.Inst.C.E.

President of the Institution of Electrical Engineers, Session 1922-23.

The Institution of Electrical Engineers, which has just celebrated the jubilee of its foundation as the Society of Telegraph Engineers, has, either from appropriate choice or more likely by happy coincidence, selected as its president for the ensuing year a member who has been prominently connected with what is generally known as the "light-current" side of the industry. Telephone men the world over will recognise the wisdom of the Council's choice.

Frank Gill was born on October 4th, 1866, the son of an Advocate in the Isle of Man. He entered the service of the United Telephone Co. in 1882, and subsequently joined the Telephone Co. of Ireland at Dublin, where he took advantage of the lectures and laboratory work of the Royal College of Science under that pioneer in scientific telephony, Prof. (now Sir William) Barrett. In 1890 he was appointed electrician to the Liverpool district of the National Telephone Co., and three years later became district manager of a large Lancashire area, a position which he held only for a few months, as in the same year he became district manager for Dublin and the South of Ireland. In 1896 he was promoted to the position of superintendent for Ireland.

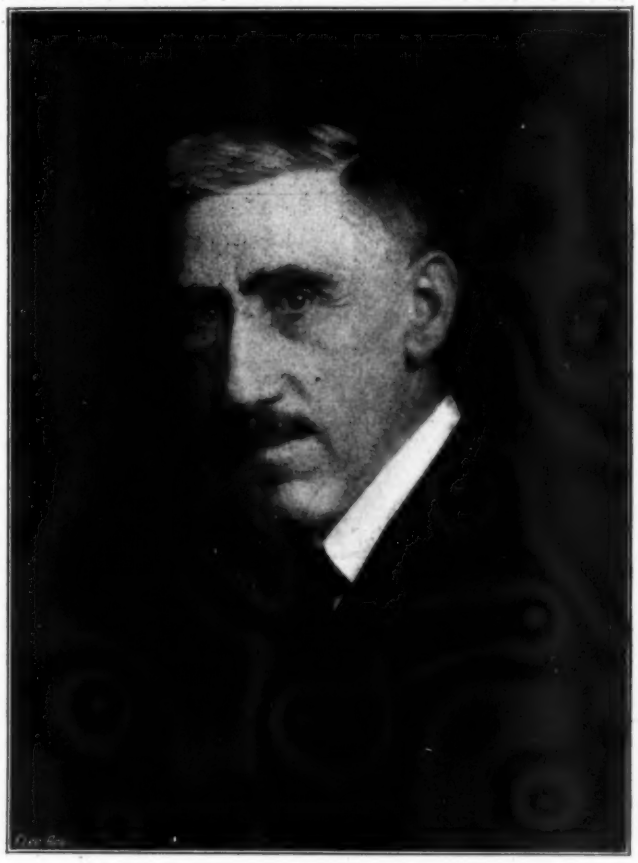


Photo by [*Elliott & Fry.*

Mr. Frank Gill,
President of the Institution of Electrical Engineers.

In 1903 the position of engineer-in-chief for the National Telephone Company became vacant. The period was a critical one, for it is not too much to say that upon the engineering depended the successful working and the satisfactory conclusion of the company's affairs at the end of their licence in 1911. The general manager, the late Mr. Gaine, selected Mr. Gill as the man who should be his technical adviser and control the engineering side of the company's work. It was during the lifetime of the company that a writer in the *National Telephone Journal* said of Mr. Gill that from the date of his appointment as engineer-in-chief "his individuality and energy began to impress themselves not only on the undertaking of the company, but to an equal degree on the company's staff. He insisted on a more exact method of considering telephone problems than the older generation of telephone men had been wont to make use of, and this exactness has permeated the company's staff to the advantage of company and subscriber alike." Though he has made many useful inventions and novel applications in the art of telephony, he has never approached his problems from the standpoint of the inventor. To this fact his success has been largely due. Individual predilections have been subordinated and an unbiased mind applied to the selection of the best available material for the purpose in view.

Up to the time of the transfer of the service to the Post Office, Mr. Gill remained engineer-in-chief, and was retained by the company to advise in that capacity in the subsequent arbitration and settlement. Only insiders know just how much of the work fell upon Mr. Gill, but it is generally known that his share was large and of the first importance. In the prolonged examination and cross-examination of the arbitration his comprehension of main principles, his grasp of detail, and his fair and clear exposition impressed both friend and foe alike.

When the company's affairs were finally disposed of Mr. Gill founded with Mr. Cook the firm of Gill & Cook, practising as consulting engineers, and in this capacity planned some new systems and investigated many existing systems in various parts of the world. Throughout his career Mr. Gill has made a study of telephone conditions in other countries, and is familiar with those of probably every country in Europe and the principal ones of North and South America, together with the arrangements prevailing for international communications. During the war his energy and organising powers found ample scope in the Ministry of Munitions, his services being recognised by his being made an O.B.E. After the Armistice he took up the important appointment which he now holds of engineer-in-chief to the International Western Electric Co.

Mr. Gill was an Associate of the Institution in 1891, member 1898, and hon. secretary to the Dublin Local Section from 1899 to 1902. He was elected to the Council in 1903, and in 1906 he was elected as vice-president. He was again elected to the Council in 1912 and 1913. He is also a member of the Institution of Civil Engineers, a Fellow of the American Institute of Electrical Engineers, and a member of the Electrical Section of the British Engineering Standards Committee. His contributions to the *Proceedings* of the Institution have been numerous and important, and he has rendered many valuable services, executive and otherwise, to the Institution. Though a telephone man, he is no sectionalist; his interests are wide and his experience of heavy engineering considerable, so that members of the heavier branches of the industry need have no fear that the session under his presidency will be unduly "light." Ernest in his aims, direct in his methods, Mr. Gill may be relied upon to uphold the best traditions of his high office, and to promote the interests of the Institution, the status of the engineer and the progress of the industry in all its branches.

F

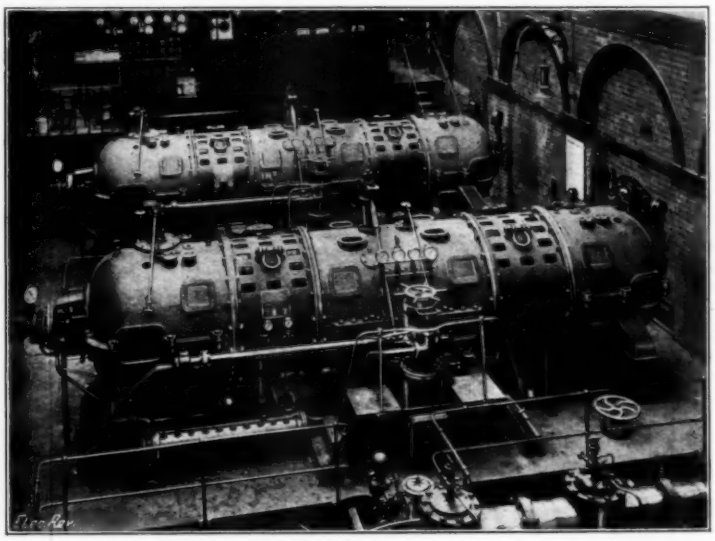
ELECTRICITY SUPPLY AT NELSON.

Inauguration of New Plant.

The Nelson municipal authorities were amongst the first to undertake the provision and supply of electricity. By the Nelson Electric Lighting Order, 1883, the local board secured the necessary powers, but it was not until about 1889 that it was in a position to commence the supply. The initial plant was installed at the gas works, and consisted of a Willans & Robinson (Rugby) G. G. type engine coupled to a 100-kW Holmes (Newcastle) dynamo, electricity being supplied at 110 volts and distributed on a two-wire system. Steam was provided by the gas works boilers, and the supplies of both gas and electricity were combined in one department.

In 1900 a site adjacent to the destructor works was selected in order that the steam generated by the destruction of refuse might be utilised, and also to obtain the necessary space for the provision of a car shed in connection with the tramway undertaking then about to be electrified. On March 12th, 1902, the new plant was inaugurated. It comprised three Willans-Bruce Peebles 200 kW sets, generating at 460-550 volts d.c. In 1903 another 400-kW Willans - Bruce Peebles set was added, raising the total capacity to 1,000 kW. Since that year until the recent extensions no addition had been made to the plant.

The Corporation electricity undertaking supplies the borough of Nelson and the urban district of Barrowford, and affords a supply in bulk to the urban district of Brierfield. During the year ended March 31st, 1922, the total number of kWh sold was 1,521,199 (the traction supply was furnished by Burnley and Colne), the h.p. of the motors connected to the mains being 1,560, and the number of lamps connected 75,841. The generating station is situated on a site adjoining the Leeds and Liverpool Canal, from which water is obtained for condensing purposes.



Brush-Ljungstrom 3,000-kW Turbo-generators at Nelson.

At a meeting of engineers before the Chief Electricity Commissioner, Sir John Snell, in London, at which Mr. R. Blackmore, of Stalybridge, together with Mr. G. F. Nayler, engineer and general manager, represented Nelson, sanction was obtained for the Corporation to install additional plant in its existing buildings. The scheme approved by the Council included two 3,000-kW, 6,600-volt, 3-phase, 50-period standard Brush-Ljungström sets, each of which is designed to work at a steam pressure of 200 lb. per sq. in. at the turbine stop valve (the steam being superheated 262 deg. F.), exhausting into a vacuum of 28½ in. of mercury (barometer 30 in.). Each turbine is coupled direct to two 3-phase alternators having a combined output of 3,000 kW at a power factor of 0.8, and wound for 6,600 volts, 50 cycles. The exciter is coupled direct to one of the alternators, and the regulation of the set is affected solely by regulation of the exciter field, for which purpose a finely graded regulator is fixed on the switchboard. The combined set runs at 3,000 r.p.m., and is capable of carrying an overload of 25 per cent. for two hours.

Each turbo-alternator set is mounted on a Brush surface condenser, which is the standard method adopted for this plant. The whole of the weight of the turbo-alternator is thus carried by the condenser, resulting in a great saving of foundation work. Each condenser has a cooling surface of 5,200 sq. ft., and is capable of dealing with 32,420 lb. of exhaust steam per hour, with circulating water at a temperature of 70 deg. F. The condenser tubes are 12 ft. 9 in. in length and ¾ in. in diameter. Each condenser has 2,115 tubes, and is provided with a three-throw Edwards air pump, 17 in. by 12 in., running at 120 r.p.m. and driven by a Brush standard d.c. 18-h.p. motor through gearing.

A hotwell pump is provided, driven off the air-pump crankshaft, for lifting the condensate to the hotwell, whence it returns to the boilers. The circulating pump is by Messrs. Drysdale & Co., and is capable of delivering 4,800 gallons per minute against a total head of 25 ft. when running at 720 r.p.m. The pump is driven by a 55-h.p. standard Brush motor, to which it is coupled direct. The motor is controlled by an Ellison oil - immersed rotor starter and stator circuit-breaker of the floor mounting type.

For filtering the air to the alternators, a Davidson wet air filter is provided of the spray type.

The rotary converting plant for the supply of the direct current through the present supply mains, together with h.p. and direct switches for the generators, rotary converters, &c., is the work of the Metropolitan-Vickers Electrical Co., Ltd. It comprises a control desk in the generating room, e.h.p. switch cubicles in a room some 40 yards away, which contain 6,600-volt oil switches, and three rotary converters of 500 kW each for use in connection with both lighting and traction supplies.

In the boiler house, three water-tube boilers with chain grate stokers have been provided. Each boiler has an evaporative capacity of 25,000 lb. of water per hour, and is complete with superheater; economisers by Messrs. E. Green & Sons are fitted to all the boilers. A steel chimney 100 ft. high by 8 ft. 6 in. in diameter, induced draught fan and electric motor, with galleries, dampers, valves and ash hoppers complete the boiler-house installation, all of which has been carried out by Messrs. Babcock & Wilcox, Ltd. The circulating water and steam piping has been installed by the Superheating Units, Ltd. The boiler feed pumps of 75,000 lb. hourly capacity each have been supplied by Messrs. J. & G. Weir, Ltd., and installed by the Nelson Corporation staff, who have also been responsible for the whole of the wiring.

The supply and laying of the h.p. and l.p. cable and ducts have been carried out by W. T. Henley's Telegraph Works Co., Ltd.

On October 12th the plant was inaugurated by Ald. W. F. Cooke, chairman of the Electricity Committee, in the presence of a large gathering of members of the Town Council, Corporation officials, and representatives from neighbouring authorities.

The Mayor (Councillor R. W. Gibson) presided, and explained that Nelson would now be able to provide electricity not only for the town's use, but for neighbouring authorities in addition. He acknowledged the debt they owed to Colne and Burnley for their assistance during the trouble they had had with their old electrical plant.

Ald. Cooke reminded the visitors that in the weaving establishment of Messrs. J. Nelson & Sons they had the largest weaving shed in the world, which, he added, was driven by electricity.

Major Coulson (Brush Electrical Engineering Co., Ltd.), on behalf of the contractors, presented to Ald. Cooke a silver salver to mark their pleasant association during the extension of the electrical undertaking.

THE CANNOCK U.D.C. ELECTRICITY UNDERTAKING.

An Interesting Bulk Supply Scheme.

The inauguration of electricity supply within the Cannock Urban District Council's area, the official ceremony in connection with which took place on the 18th inst., will have an important influence on the future progress and development of the district generally. The Cannock Council secured the necessary powers as far back as 1901, but not until two or three years ago did it appoint Messrs. Arthur Ellis & Partners, of Cardiff, as its consulting engineers to advise generally with regard to the scheme.

The total estimated cost of the scheme was £82,572, and in connection with the first section of it the Council made application to the Electricity Commissioners for a loan sanction of £36,753. Of this amount the Commissioners sanctioned the borrowing of £27,000 on account, subject to further loans that may be required.

The Cannock area of supply is situated in the North-West Midlands Electricity District, and it represents a very important part of the larger district. The Electricity Commissioners have accordingly sanctioned an agreement under which Wolverhampton Corporation supplies Cannock in bulk upon terms which will permit it to distribute from the sub-station at Queen Street at rates which are considered to be most reasonable.

The power transmitted will be the usual 3-phase, a.c. at 30,000/33,000 volts. This will be controlled from the Queen Street sub-station, at which the voltage is reduced to 6,600 volts for distribution by means of high-pressure cables laid within the district to meet the requirements of collieries and industrial works, whilst arrangements are also being made whereby (by means of transformers) the pressure is reduced to 400 and 230 volts for purposes of distribution upon a 4-wire, 3-phase system for private consumers.

Whilst it is anticipated that in the very near future there will be a demand of something like 5,000 kVA, it is interesting to note that it has been computed that there is a potential load within the Cannock area of something like 15,000 kVA. Already the Council has secured two important consumers in the West Cannock Colliery Co., Ltd., and the Cannock and Rugeley Colliery Co., Ltd. Supply to the first-named was given on September 22nd last, whilst the Council intends proceeding with the work necessary to afford a similar supply to the Cannock and Rugeley Colliery.

The provision of supply in bulk from the Wolverhampton Corporation has necessitated the laying of about 9½ miles of e.h.p. cable from the electricity works at Wolverhampton to the sub-station at Queen Street. The cable is looped in and out of the Holly Bank Co.'s new Hilton Pit, which is to be totally electrically driven, and is about 4½ miles from Wolverhampton. (A 6-mile, 33,000-volt, 0.2 sq. in. cable, with Merz-Beard pilot protection also delivers a bulk supply at the Ocker Hill station of the Midland Electric Corporation for Power Distribution, Ltd.)

The main transmission cable is a 0.2 sq. in. 3-core cable paper-insulated, lead-covered, and steel-armoured, laid direct in the ground. It is protected by means of a pilot cable designed to work on the Merz-Beard compensated system, the pilot cable comprising also conductors for use in connection with a telephone system which will ensure direct communication between the Wolverhampton Corporation's generating station and the various sub-stations.

The scheme provides for a 6,600-volt ring main right round the district. This ring will ultimately be supplied direct from the sub-station by feeders running radially from the main sub-station to various sub-stations along the ring, so that ultimately certain local sub-stations may be supplied from three directions and the remainder from two directions, and in such a way as to secure continuity of supply.

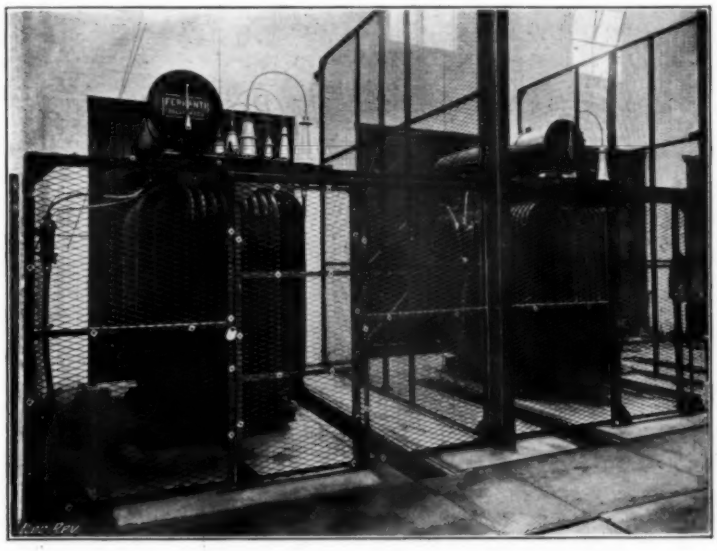


Fig. 1.—Ferranti 1,250-kVA 33,000/6,600-V Transformers.

At present the equipment of the main sub-station comprises four 33,000-volt cubicles and operating panels, one of which is the incoming feeder panel belonging to the Wolverhampton Corporation, controlling the main bulk supply, a metering panel of joint ownership, and two transformer panels for controlling the supplies to the two transformers, which are protected on the G.E.C. biased system (McColl patents).

The 6,600-volt supply is obtained by means of two

1,250-kVA transformers connected in "mesh" on the 33,000-volt side and "star" on the 6,600-volt side, the neutral point being earthed. Two transformers, each of 125-kVA capacity, are used for the purpose of further reducing the pressure to 400 and 230 volts for distribution within Cannock town itself.

The whole of the main sub-station equipment has

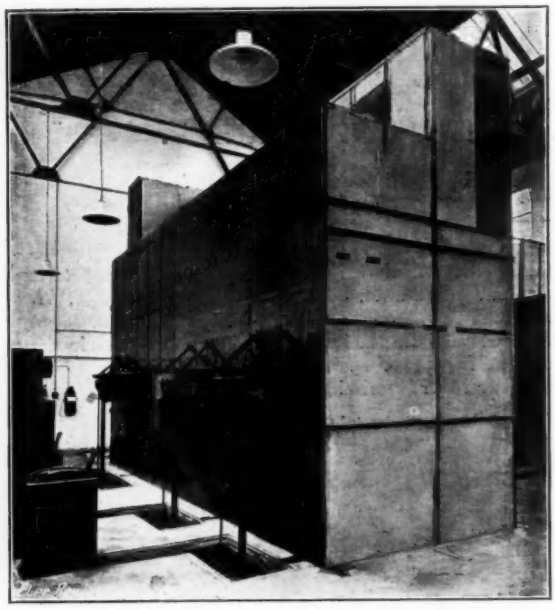


Fig. 2.—Stonework 33,000-V Switchgear Cubicles.

been supplied and erected by the General Electric Co., Ltd., the transformers (fig. 1) having been manufactured by Messrs. Ferranti, Ltd., as sub-contractors. The 33,000-volt, 6,600-volt, and 400-volt mains have

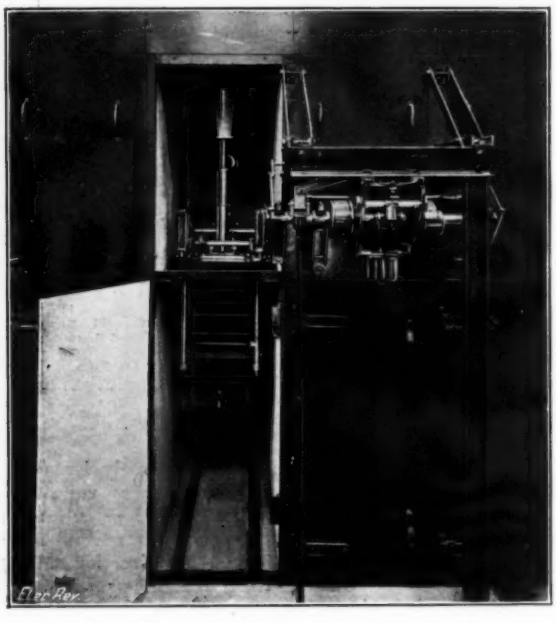


Fig. 3.—G.E.C. Oil Switch.

been supplied and laid by the British Insulated and Helsby Cables, Ltd.

The switchgear was manufactured at the G.E.C. works at Witton; the 33,000-volt stonework cubicles (fig. 2) are built upon iron framework, each unit being separated from the next by moulded stonework slabs, with sheet-steel doors at the back and front. Each cubicle is sub-divided by stonework slabs into separate cells in order to secure safety. The bus-bars each occupy a separate cell, while isolating links are in another division, and each oil-switch tank has an independent compartment. The porcelain insulators between the compartments are so designed as to prevent any fumes generated in the oil-switch compartment passing to any other compartment. Each phase of the oil switch is in a separate tank.

The oil switches (fig. 3) have a maximum breaking capacity of 350,000 kVA, the total break per phase is 12 in.; the head of oil above the contacts is 11 in.; the

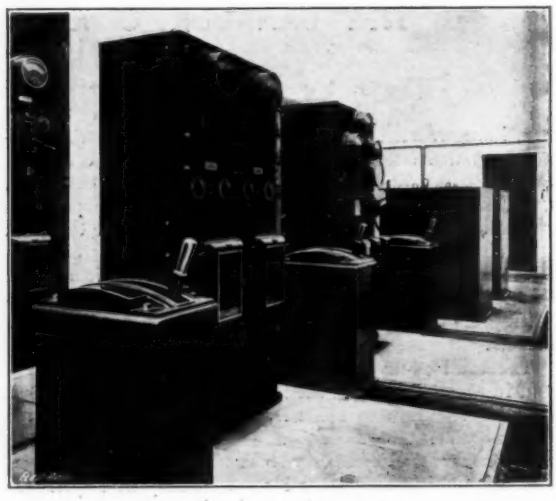


Fig. 4.—G.E.C. Oil-Switch Control Gear.

volume of oil, 66 gallons. The control of the switches is by signal levers and suitable bell-crank mechanism which, together with the instrument panels, are shown in fig. 4. The tanks are of welded steel and lined with 3-ply birch—a non-resinous wood, which is absolutely essential, as otherwise the resin collects upon the contacts and may prevent their opening. A speed of break of the contacts of 5 ft. per second has been obtained. When opening under conditions of short circuit the magnetic blow-out effect of

Fig. 5.—The 6,600-V Switchboard.

the current increases the speed above this figure. The moving parts of the switch are naturally rather heavy, and an air dash-pot is provided so that no damage can be caused by the switch mechanism being suddenly closed.

Some details of the G.E.C. biased system of protection, as applied to transformers, should be mentioned. Protection against faults of any kind, including leaks to earth, between phases, and even between turns of the same phase, is said to be provided by this system. The main underlying principle is based on a comparison

of the currents that enter and leave the various windings; but by the special refinement introduced in accordance with the McColl patent, it is possible to employ, it is claimed, unusually sensitive settings for the relays to avoid the danger of instability upon overloads and to remove the necessity for very exact, and therefore delicate and expensive, apparatus.

If all is in order in the transformer, the entering and leaving currents are in constant proportion, the current ratio obviously being modified by a leak. Current transformers at either end of the windings supply proportionate currents to the relays, which open the circuit breakers when a derangement occurs.

The special feature of this system consists of restraining the action of the relays by a coil excited in proportion to the load current. Thus, the fault setting increases with the load, and can be safely made sufficiently sensitive to act in response to a small leak without introducing the likelihood of improper tripping when a heavy overload increases all the currents in the circuits, and may easily swamp a moderate, but constant, setting. The importance of this is due to the fact that the great majority of transformer faults originate as small leaks between adjacent turns, which

Fig. 6.—The 400-V Switchboard.

ordinarily have to continue burning the insulation until the damage is sufficient to trip the less sensitive relays.

Overload protection may also be afforded by the McColl relays, this practice being adopted in the case of the gear at Cannock. The relays are shown on the front of the operating board in fig. 4.

The 6,600-volt and 400-volt switchgear is enclosed in sheet-steel cubicles, and the respective boards are illustrated in figs. 5 and 6. Interlocking arrangements render it impossible for the isolating links to be opened until the oil switch is in the "off" position.

In addition to the sub-station at Queen Street, Cannock, an important sub-station has been provided by the West Cannock Colliery Co. at its premises at Hednesford, to which the Council has already laid the main. This sub-station will control the distribution of the supply throughout the colliery premises for different purposes. The Cannock Council has installed in this sub-station switchgear supplied and erected by Messrs. Reyrolle & Co. to the specifications of the Council's consulting engineers, whilst the Colliery Co. has, in turn, provided somewhat similar switchgear as well as transformers for reducing the 6,600-volt supply to the pressure necessary for its own purposes, all of which has been carried out to the designs and specifications of the company's consulting engineers (Messrs. Walter Dixon & Co., of Glasgow).

The main 6,600-volt cable between the Council's sub-station at Queen Street and the sub-station at the colliery premises consists of three split-conductors each of 0.10 sq. in. sectional area. This, again, is a paper-insulated cable, lead-covered, wire-armoured, and laid direct in the ground with suitable protection.

It is estimated that in the immediate future at the West Cannock Colliery alone there will be a demand of something like 800 kVA, whilst the requirements of the Cannock and Rugeley Colliery Co. will very substantially add to this demand, so that almost from its inception the undertaking attains considerable importance, apart from the supplies to other consumers at Cannock, including public lighting.

The demand for electricity for private lighting purposes has already been such as to justify the Council's decision to carry out an extension of mains along the New Penkridge Road.

Further powers from the Electricity Commissioners are being applied for, and, if granted, they will enable the Council to extend the use of electricity over a much larger area, the proposed additional area of supply embracing such districts as Cheslyn Hay, Great Wyrley, Huntington, Penkridge, Hatherton, Brereton, Rugeley, and a small part of Brownhills. The area of supply administered by the Cannock Council as at present defined has a length from east to west of about six miles and a breadth from north to south of about three miles, but this, if the extension order is granted, will be increased in length to approximately 10 miles.

FORTHCOMING EVENTS.

Electrical Power Engineers' Association (Southern Division).—Saturday, October 28th. At the Hotel Cecil, Strand, W.C. At 5.30 p.m. for 6 p.m. Fourth annual dinner.

Paisley Association of Electrical Engineers.—Tuesday, October 31st. At the Palace Tea Rooms. At 7.30 p.m. Paper on "Practical Dynamic and Static Balancing of Machinery," by Mr. F. G. O'Hagan.

Institution of Railway Signal Engineers.—Wednesday, November 1st. At the Institution of Electrical Engineers, Victoria Embankment, W.C. At 3 p.m. Resumed discussion on Mr. Lascelles' paper on "Weissenbruch's Signal System on the Belgian State Railways."

Institution of Electrical Engineers.—Thursday, November 2nd. At the Institution of Electrical Engineers, Victoria Embankment. At 6 p.m. Inaugural address by the president (Mr. F. Gill).

(South-Midland Centre).—Students' Section.—Monday, October 30th. At Birmingham. Paper on "Energy Meters Used on a.c. Systems," by Mr. L. B. Francis.

(East Midland Sub-Centre).—Tuesday, October 31st. At the Derby Technical College. At 7 p.m. Paper on "Electricity in Small Houses," by Mr. J. W. Beauchamp.

Chelmsford Engineering Society.—Thursday, November 2nd. At the East Anglian Institute of Agriculture. At 7 p.m. Paper on "Effect of Heat Treatment on the Microstructure of Steel," by Mr. J. G. Widdowson.

Chemical Society.—Thursday, November 2nd. At Burlington House. At 8 p.m. Ordinary scientific meeting.

Warrington Electrical Exhibition.—November 2nd to November 11th. At the Empire Hall.

International Motor Exhibition.—At Olympia, W., and White City, Shepherd's Bush, W. November 2nd to November 11th.

British Electrical Development Association.—Salesmanship Conference. Friday, November 3rd. At Caxton Hall, S.W. At 7.30 p.m. Paper on "Fires and Cookers (Large)," by F. H. Howell.

Junior Institution of Engineers.—Friday, November 3rd. At 39, Victoria Street, S.W. At 7.30 p.m. Lecturette, "Laminated Springs," by Mr. T. H. Saunders.

Finsbury Technical College Old Students' Association.—Saturday, November 4th. At the Engineers' Club, London. Annual dinner.

THE "ELECTRICAL REVIEW" SERVICE DEPARTMENT.

To enable us to complete replies to queries received this week we need the names of manufacturers or suppliers of:—

Wade's electrically-driven saw.
Robson lamplocks.

NOTES.

Ljungström's Steam Turbine Locomotive.—*Svenska Dagbladet* learns that the Ljungström steam locomotive has now been equipped with a new device for increasing the capacity of the condensers, &c., so that the locomotive is capable of taking steeper gradients than hitherto and is able even to develop greater power than any corresponding express locomotive driven by a piston engine.—*Reuter's Trade Service* (Stockholm).

Service Notes.—It is officially stated that officers and other ranks of the Regular Army, Militia, Territorial Army, or Officers' Training Corps who wish to install private wireless sets for sending or receiving messages, are subject in all respects to the Postmaster-General's regulations governing the installation and working of such sets. They should apply in their private capacities for transmitting or receiving licences to the General Post Office, which will treat their applications on the same lines as those received from members of the public generally. The War Office accepts no responsibility for wireless sets other than those held on the authorised establishment of units.—*The Times.*

Italian State Services Condemned.—A correspondent of *The Times* says that representatives of the most important industrial concerns of Italy held a meeting on October 17th, at which a large number of Senators and Deputies were present. After a lively discussion the meeting passed a resolution to the effect that all the public services, such as the railways, posts and telegraphs, &c., now in the hands of the State should be handed over to private enterprise. This, it was said, would greatly improve the various services, and at the same time relieve the State of the burden of the losses which were being incurred.

Lecture.—On October 19th, at the Hackney Town Hall, Mr. L. L. Robinson, the borough electrical engineer, delivered a lecture on "Hackney Electricity" to a female audience. The lecture was followed by a demonstration of electric cooking.

Electric Steering Gear.—At a meeting of the Council of the Yacht Racing Association, the opinion was expressed that Mr. R. H. Lee's action in fitting electric steering gear to his large cutter *Terpsichore* was contrary to the spirit of the Association's rules.

Wave Transmission.—On Monday last the claim of Messrs. Walter Haddon and G. Constantinesco for the use during the war of the C.C. interrupter gear for firing bullets between the revolving propeller blades of aeroplanes was brought before the Royal Commission on Awards to Inventors. Over 30,000 of these gears were made by Messrs. Dormans, of Stafford, during the war. The system affords a convenient means of utilising electrical motive power for actuating rock drills.

The Statistical Man.—(There is an opinion prevailing among technical staffs that the function of accountancy departments is to involve the former in as much arithmetical complication with regard to emoluments as is humanly possible.)

From an age quite embryonic,
I've developed quite a chronic
Inclination for statistics
  With regard to £ s d;
And I don't mind the admission
That my present high position
Is due to my ambition
  To promote economy.
So I warble each day,
In my whimsical way,
  As I whittle and wangle and plan;
Oh, I'm a statistical,
Really tight-fistical,
  Mystical, twistical man.
I've a way of calculating,
That's extremely complicating,
To the unsophisticated,
  Ever-trusting employé.
I'm a sphinx who stands alone as
The man who bear the onus
Of jumbling up the bonus
  With the basic salaree.
So I chuckle and say,
In my humorous way,
  When I give them my statements to scan,
Oh, I'm a statistical,
Really tight-fistical,
  Mystical, twistical man.

ANON.

Miners' Lamps.—In the "Safety Lamps Order" of September 21st, 1922 (H.M. Stationery Office, 9d. net), a number of miners' electric lamps are approved for general use, including the "T.K.," "Lemaire," "Thor," "H.I.," "Ceag," and "Davis-Derby" types. Several patterns are approved for special purposes, and amendments to previous orders appear. An appendix contains lists of lamps approved to date, with amendments.

Educational.—WIRELESS IN LONDON SCHOOLS.—The London Elementary Education Sub-Committee recommends the inclusion of wireless telegraphy in the curriculum of an approved number of elementary schools. The Sub-Committee reports that applications have been received from certain schools for sanction to include the principles of wireless telegraphy in the curricula and to obtain a licence from the Postmaster-General for the installation of the equipment. The equipment, it is stated, is made by the boys in their handicraft lessons. So far permission has been given by the Sub-Committee to thirteen schools, and it has made a limit of twenty-five schools.—*The Times.*

R.N.D. Engineers' Dinner.—The fourth annual dinner of the Royal Naval Division, Engineers, Signal Company, will be held at the Engineers' Club on November 18th at 6.30 for 7 o'clock. Mr. G. W. Hilditch will occupy the chair. Morning dress will be worn. Tickets, 10s. 6d. each, may be had from Mr. J. N. Robertson, 20, Manor Court Road, Hanwell, W.

The Jeffrey Battery Locomotive.—An interesting design of "arc-proof" battery locomotive that has been approved by the U.S. Bureau of Mines for operation in gaseous mines is described in the *Electric Vehicle*. A distinctive feature of the Jeffrey locomotive is the swinging or pivoted battery box, which can be swung through 90 deg. When the battery is swung round to this position the motors, which are overhung outside of the wheel base, are accessible for inspection. Another advantage of this construction is that it makes it necessary to disconnect the battery from the locomotive wiring in order to swing it. When such a locomotive is put on charge after the battery box is swung round, the electrical equipment in the locomotive has no connection with the battery; in other words, the battery can be put on charge without risk of any connection being made with the locomotive wiring. This permits the locomotive and its electrical parts to be inspected and repaired while the battery is being charged, and is a valuable safety device. The switch box compartment, containing an ampere-hour meter and charging plug (in normal operation there is no arc formed in this compartment), is constructed just to give mechanical protection to the electrical parts. This cover is locked with a padlock when the locomotive is sent out on the road. On the side of the switch box is a compartment in which renewable fuses are mounted. The main switch handle, which projects through the middle compartment, must be moved down and out of the way before the fuse box compartment can be opened. When this locomotive is out on the road and blows a fuse, the motorman can renew the fuse only after he has opened the main-line switch, disconnecting the battery completely from all of the electrical equipment, not only in the switch box, but from the locomotive proper. All electrical parts inside the switch box are dead when the main-line switch is open. It is not possible for a man to touch any live part, or in any way cause an arc to be formed while the fuse box lid is open. The British agents for this locomotive are Messrs. Hugh Wood and Co., Ltd.

New French Electric Vehicles.—At the annual Paris motor show, which opened on October 5th in the Grand Palais, Champs-Elysées, and in the annexe on the Esplanade des Invalides, a new 5-ton electric motor lorry was displayed by Messrs. Laporte, Fils & Cie., of Toulouse. A battery of Tudor accumulators supplies two 7½-h.p. electric motors which drive the rear road wheels through reduction and internal gearing. It is stated that the municipal authorities of Toulouse have half a dozen Laporte machines in operation for dust collection purposes.

A feature of the commercial vehicle section of the show was a railless trolley motor 'bus,' constructed by the firm of Henri Crochat; it forms one of a number which has been built for service between the town of Modane and the village of Lanslebourg, near the summit of the Mont Cenis Pass, a distance of about twenty miles. The vehicles are of the single-deck type and have seating accommodation for twenty-five passengers.

The Electrical Trades Benevolent Institution.—The annual festival of this Institution, which had been fixed for November 15th, has had to be postponed owing to the choice of that day for the General Election; it will therefore be held on Wednesday, November 29th, at the Trocadero Restaurant, London, W., at 7.30 p.m. Sir James Kemnal will preside, and ladies will be present.

The objects of this admirable Institution, of which the president is Sir David Salomons, Bart., M.I.E.E., and the hon. secretary is Mr. F. B. O. Hawes, A.M.Inst.C.E., M.I.E.E., are: "To grant pensions and to dispense temporary relief to deserving and necessitous persons who are or have been engaged in the electrical trade in the United Kingdom, as employers, managers, teachers, or on the engineering, designing, drawing, sales, or office staff, or in any other similar capacities, or to their dependents."

The purpose of the Festival is to make a special collection in aid of the funds, which remain far below the level that they should attain, in view of the importance of the industry and the needs of its necessitous members. The persons aided by the Institution are not entitled to assistance from other sources, and whilst it has been possible up to the present temporarily to relieve all urgent cases, mainly out of the small subscriptions of the enrolled members, the interest on invested

funds is far from sufficient to provide pensions for those who are incapacitated for further work, or for their dependents. It is hoped, therefore, that in spite of the hard times there will be a generous response to the appeal of Sir James and the committee in connection with the Festival.

Large Incandescent Lamps.—What are claimed to be the largest incandescent lamps ever made are produced in the U.S.A. and are intended for the illumination of motion picture studios. The lamps are over 2 ft. in height and of 30-kW power at a pressure of 220 volts; they are rated at 100,000 c.p.

Appointments Vacant.—Chief engineer (£E852+bonus), for the Sudan Government Posts and Telegraphs Department; combustion engineer (£600), for the Victorian Electricity Commission; charge engineer, for the Southend Corporation Electricity Department. (See our advertisement pages to-day.)

Ship's Electric Laundry.—A fully-equipped electric laundry is one of the outstanding features of the new Cunard liner *Franconia*, which was launched on October 21st from the yard of Messrs. John Brown & Co., Ltd., Clydebank, Glasgow.

Water Power and Austria's Recovery.—H.M. Commercial Secretary at Vienna (Mr. O. S. Phillpotts) takes a more hopeful view of the possibility of Austria's economic recovery than is generally accepted. In his report to July this year, which has been issued by the Department of Overseas Trade, he states that Vienna has made further progress during the past twelve months in maintaining her pre-eminence in the foreign trade and in the finance of that part of Europe, that the general trade of the country has improved and that on the whole Austrian industries have been working at 60 per cent. of their capacity.

Of German penetration the most notable instance is the purchase by Herr Stinnes of a large interest in the Alpine Montan Co. The loss on the Government munition works, which are now producing other goods, afforded an opportunity to the German A.E.G. to take over the largest, viz., the Woellersdorf works, on a fifty years' lease.

With regard to possible hydro-electric developments, the report points out that the exploitation of the ample unused water power in the Alpine districts and in the Danube has from the beginning been recognised as an obvious method of improving the economic condition of Austria, since the trade-balance is weighted by the necessity of importing so much coal and oil from abroad. The water-power actually harnessed by the end of 1920 amounted to 170,000 h.p., less than 10 per cent. of the total available, while Switzerland had over 22 per cent. in use.

At first, after the war, there was a tendency to delay work until foreign capital could be found, as it was expected that the crown would some day improve in value, and that the Austrian capital invested when the crown was low would then never be able to earn dividends. As, however, the crown has steadily fallen and all endeavours to attract foreign capital have hitherto proved unsuccessful (with the exception of a small participation of German and Swiss money in the Tyrol) the various provincial governments have now founded Austrian companies, part of the capital being raised by the authorities, part by the banks, and part by the public, and construction has been started on a number of important works. In view of the continued depreciation of the currency, it is doubtful whether enough funds can be raised in the country to complete the more ambitious schemes that have been commenced, and the exploitation of the Danube waterpower has been postponed for the present.

According to published statistics, 24 large works which, when completed, would yield 99,400 h.p. were under construction in 1921, and some others, such as the Lower Austrian and Styrian provincial schemes have been commenced since the end of the year. The 99,400 h.p. includes the federal railway works for the electrification of the lines in Vorarlberg, the Tyrol and Salburg, the provinces furthest from coal supplies. It is hoped to complete these in five years, but the electric traffic on parts may be started in 1923 and 1924. The cost of construction for the railway electrification is proving very many times greater (in crowns) than the original estimates, and like most other government expenditure, is being paid for practically by the printing of banknotes. The electrical engineering and locomotive industries, which are well developed in Austria, have received large orders in connection with the various waterpower schemes.

The Professional Classes Aid Council.—The report of this body for 1921-22 shows that applications for help were made by 626 persons; 66 of these received financial assistance and 296 were advised. The accounts show an income of £7,749, and a sum of £5,443 expended in relief.

Spain's Hydro-electric Power.—Recent hydro-electric developments in Spain are detailed in a report which the United States Commercial Attaché in Madrid has made to Washington. The important new installations may be divided into two groups, one lying in the province of Lerida and Gerona and aggregating 146,500 horse-power, the other centreing at the falls of Dos Aguas and of the Cinca in the Aragonese Pyrenees.

An estimated total of 300,000 horse-power of hydro-electric installations was under way in Spain at the beginning of 1921, of which the plant of the Riegos y Fuerzas del Ebro, at Camarasa Falls, Lerida, was finished during that year. Power from both of these groups is transmitted to Barcelona at 110,000 volts. At the beginning of this year the hydro-electric resources of Spain in actual exploitation were estimated at from 500,000 to 600,000 h.p. This, says the Commercial Attaché, is only about one-tenth of the potential energy possible of development.

As the consumption of electrical energy increases in the capital and other large cities of Spain through the extension of electric lighting and railway electrification, and the use of electricity in manufacturing, the scarcity of power is more and more in evidence. At the same time the public is demanding better traction facilities.

It cannot be said that the Spanish Government has adopted a favourable attitude towards the efforts to create enterprises which are urgently needed and would help the economic progress of the country. By a Royal Decree of June last year, concessions for the exploitation of hydro-electric power will be granted for 75 years, at the end of which time all the works, machinery, transportation lines, and the like, will revert to the State. Protests against this regulation have been made by the electrical enterprises, the chambers of commerce and industry, by foreign embassies, and by many other groups throughout the country, and it is hoped that the legislation will be modified.

Other legislation which has been contrary to the interests of the development of these national industries has been the raising of import tariffs on machinery, material, and accessories, which are necessary for these electrical enterprises and are not produced in Spain. All these factors will undoubtedly retard the exploitation of Spain's hydro-electric resources.

Manchester Electro-Harmonic Society.—The opening concert of the season was held at the Albion Hotel, Manchester, on Friday last, when, owing to the indisposition of the president, Mr. J. A. Robertson, M.I.E.E., the chair was taken by Major E. J. Hogan, a member of the Executive of the Electro-Harmonic Society of London, who opened the proceedings felicitously, and conveyed fraternal greetings and congratulations from London to the Manchester Society. The Society holds its concerts on the third Friday of each month, and extends a cordial invitation to visitors who may be in Manchester. The musical direction of the concerts is in the efficient hands of Mr. W. J. Smith, of Jackson's Row, Manchester.

United States Electric Vehicle Market.—The demand for electric trucks during September was reported to be fairly good. An order for 30 trucks was recently placed by a Brooklyn bakery. The recent increase in the number of inquiries received by manufacturers is regarded as an indication that the advantages of electric vehicles for local service are becoming more generally known. The Steinmetz Electric Motor Car Corporation, which only began business a few months ago, sold 60 electric cars in the New York district during August. This company is experimenting with a 5-passenger electric car of a new type, which will be sold for 1,000 dollars. The car is now being tested and, in this connection, one of the company's engineers is now in England investigating the merits of a new type of battery which is said to be far in advance of anything now on the market. The annual electric show was opened in New York on October 7th. Owners of 200 electric trucks announced their intention of being represented in the parade, which is regarded by the industry as an excellent opportunity to show the increasing popularity of electric vehicles in the various lines of industrial activity. Electric motor truck dealers are offering a prize of 1,000 dollars for an advertising slogan to be used in future electric vehicle publicity campaigns. Twenty-nine electric trucks and passenger cars, valued at 35,954 dollars, were exported from the United States in July.—*Reuter's Trade Service* (New York).

INSTITUTION NOTES.

Institution of Electrical Engineers.—Ordinary Meetings.—According to present arrangements, the following are the details of ordinary meetings for the new session:—November 2nd, Presidential Address, Mr. F. Gill; November 16th, "The Improvement of Power Factor," by the late Dr. G. Kapp (to be read by Prof. M. Walker); November 30th, "Domestic Load Building," by Mr. W. A. Gillott; December 7th, "The Possibilities of Transmission by Underground Cables at 100,000/150,000 Volts," by Mr. A. M. Taylor; December 14th, "Electric Arc Welding Apparatus and Equipment," by Mr. J. Caldwell; January 4th, 1923, "Variable-speed a.c. Motors without Commutators," by Mr. F. Creedy; January 18th, "Works Production," by Mr. G. H. Nelson; February 6th, Annual Dinner; the next six meetings remain open, May 10th, Fourteenth Kelvin Lecture, by Dr. J. A. Fleming, F.R.S.; May 31st, Annual General Meeting.

Wireless Section.—The following meeeting has been arranged:—November 8th, "The Effect of Local Conditions on Radio Direction-finding Installations," by Messrs. R. L. Smith-

Rose, M.Sc., and R. H. Barfield, B.Sc. There will be seven other meetings, details of which will be announced later.

Informal Meetings.—The informal discussions will be as follows:—November 6th, "The Importance of Commercial Knowledge to the Engineer," opened by the President; November 20th, "Electric Light Wiring" (Mr. F. J. Pearce); December 4th, "An Electrical Installation at a Model Farm" (Mr. F. A. Sclater); December 18th, "Time Switches" (Mr. E. C. Sharp); January 8th, 1923, "The Protection of Inventions by Letters Patent" (Mr. E. W. Moss); "Insulators and Insulating Materials" (Mr. A. G. Warren); February 26th, Smoking Concert. There are to be five other meetings; details will be announced later.

Institution of Production Engineers.—The first meeting of the session was held at the Royal Automobile Club on October 20th, when the president, Mr. Max R. Lawrence, M.I.Mech.E., delivered his address, which took the form of a review of the Institution's work and future aims. He made a number of suggestions for furthering the Institution's objects and increasing its membership, as, for instance, the establishment of provincial branches, the inclusion of costs and selling prices within its purview, and maintaining an atmosphere of informality at its meetings.

Institution of Rubber Industry.—At a meeting of the Manchester Section of the Institution on October 16th, a paper entitled "Symbolic Rubber" was read by Mr. D. F. L. Zorn, chairman of the Rubber Shareholders' Association. The paper was described as "Some Philosophic Questions Reviewed in the Light of Modern Knowledge."

Chelmsford Engineering Society.—On October 12th, at the East Anglian Institute of Agriculture, Mr. Borlase Matthews gave an illustrated lecture on "Electricity Applied to Agriculture." Various types of electrical ploughing machinery were explained, also methods of making hay from stacks of wet grass by electrically blowing air through them. The electroculture of crops by the "corona" effect from overhead wires was explained, and it was claimed that this method resulted in a 10 per cent. increase. It was shown that chaff cutting, sheep shearing, milking, butter making, and in fact any operation requiring a rotary motion, could very conveniently be carried out by means of electricity. Poultry rearing also provided opportunities for the use of electricity.

On October 18th a paper was read on "Payment by Results," by Mr. J. E. Powell, who said that no system of payment by results should be adopted unless it ensured industrial content as well as commercial success. Old piece-work systems failed generally through the cutting of rates. Usually this was necessary, because the piece-work rates were fixed on the old time basis. The time allowed for a job was vitally important. If an hour was allowed for a job which should take 54 minutes, an increase of 10 per cent. in the cost of labour was the result. A discussion followed, after which Mr. Powell answered the questions raised.

Edinburgh Electrical Society.—On October 21st the Society visited the works of Messrs. Brunton at Musselburgh. The members were received by Mr. Adam and other gentlemen of the staff and conducted through the various departments. After inspecting the wire-drawing, the steel rope works, and the galvanising rooms, the members assembled in the power-house, where Mr. J. Walker gave a short descriptive address. The extensive new laboratories were next visited, and demonstrations of tensile and fatigue testing were given.

Institute of Transport.—At a meeting held on September 13th, a number of railway and tramway officials, as well as others connected in various ways with transportation, were admitted to the various grades of membership.

South African Institute of Electrical Engineers.—The gold medal of the Institute for the year 1921 has been awarded to Mr. Bernard Sankey for his paper on "Reinforced Concrete Poles for Overhead Line and Traction Work."

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the Electrical Review *posted as to their movements.*

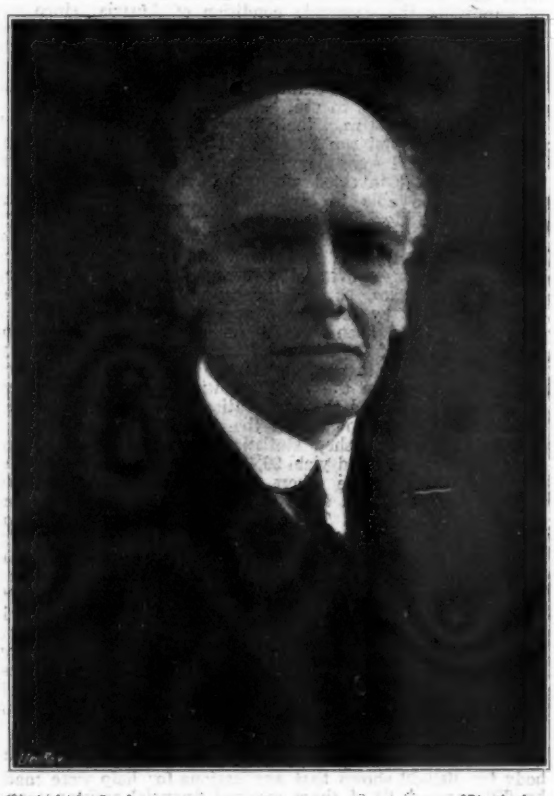
Mr. A. G. Ellis has resigned the post of honorary secretary of the North-Western Centre of the Institution of Electrical Engineers, and Mr. A. B. Mallinson, of Worsley Street, Salford, has succeeded him.

Mr. A. H. Banks, late chief assistant to the town clerk of Manchester, has been appointed clerk to the South-East Lancashire Electricity Advisory Board at a salary of £800 rising by annual increments to £1,000 per annum. Mr. Banks has for some three years acted for the electricity employers in the North-Western Area in all industrial negotiations, and upon the issue of the Commissioners' notice delimiting the South-East Lancashire Electricity District he was requested to act as honorary secretary to the conference which prepared the scheme. The conference some months ago elected the Advisory Board, which is operating voluntarily in all respects as though Parliament had confirmed the Order. That being so, the Board desired to appoint a clerk who would be entirely their officer and not connected with a constituent authority. The appointment was made unanimously, and the Board expressed the desire that Mr. Banks should continue to act for the electricity employers in relation to industrial negotiations, &c.

Mr. Barnes has been appointed chief assistant engineer to the Manx Electric Railway Co. He was trained under the chief engineer, Mr. Edmundson, and afterwards became general superintendent of the Calgary Power Co., Canada. Since 1916 he has been second electrical engineer of the White Star S.S. *Majestic*.

The Edinburgh Town Council has increased the salary of the deputy tramways manager, Mr. Fitzpayne, from £580 to £660, and that of Mr. M'Leod, of the traffic department, by £100 a year.

Professor William Cramp, D.Sc., who has been elected chairman of the South-Midland Centre of the Institution of Electrical Engineers (he delivered his address on Wednesday last), holds the Chair of Electrical Engineering at the University of Birmingham. Prof. Cramp commenced his career with Messrs. Ferranti, Ltd. He served a five-years' apprenticeship and was then engaged as a tool-maker, rising to be foreman. Subsequently he entered the firm's drawing office, eventually becoming assistant to the works manager and then outdoor erector. In 1901 he left Hollinwood to take up the position of lecturer in electrical design and demonstrator under Prof. Ayrton at the Central Technical College, South Kensington. He left this post to establish a consulting practice in 1906, first in London, eventually removing to Manchester. Mr. Frith joined him in 1914, and thus was established the firm of Cramp & Frith, which is still carried on under the same designation, although Prof. Cramp is no longer a partner. When the late Prof. Kapp resigned the Chair of Electrical Engineering at Birmingham University in 1919, Prof. Cramp was chosen to succeed him. While in Manchester Prof. Cramp lectured during a period of five years on electrical design at the College of Technology, and obtained the M.Sc. degree of that institution. For his research work Prof. Cramp was granted the degree of D.Sc. by the University of Manchester; it was his *penchant* for research which led him to abandon consulting work for the Birmingham chair, which affords him ample opportunities for exercising his recognised talents in this direction. Prof. Cramp also holds the degree



Whitlock & Sons] [Birmingham.

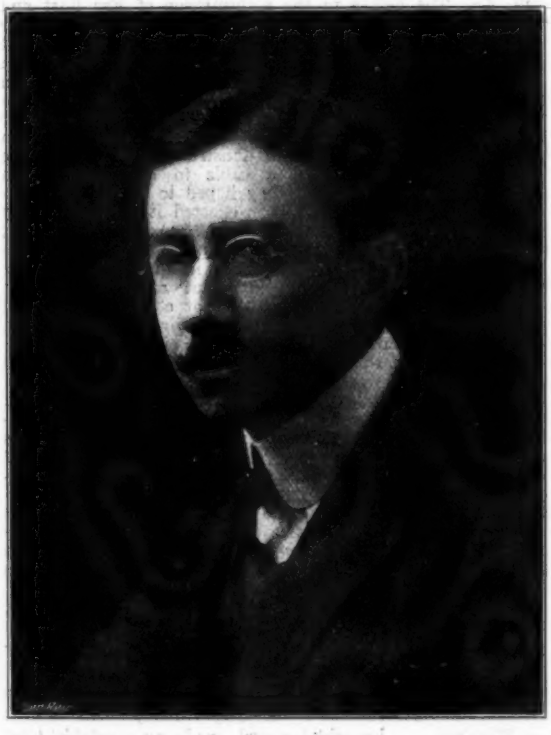
Professor W. Cramp, D.Sc.,
Chairman of the South Midland Centre of the I.E.E.

of M.Sc. (Birmingham); he was chairman of the North-Western Centre of the I.E.E. in 1911-12; in 1921 he delivered the James Watt anniversary lecture at Greenock; and in the same year he was awarded the silver medal of the Royal Society of Arts for research work in connection with pneumatic conveying. Prof. Cramp has made many contributions to the literature of technical science: mention may be made of a paper presented to the British Association in 1903 on single-phase repulsion motors; "Magnetic Leakage and its Effect in Electrical Design," which received a special I.E.E. premium; and the descriptions of the Cramp single-phase motor which appeared in the Electrical Review in 1906 and 1907. The following books also stand to Prof. Cramp's credit:—"Continuous Current Armature Windings," "Continuous Current Machine Design," and, in collaboration with Dr. C. F. Smith, "Vectors and Vector Diagrams in the Alternate Current Circuit." The last was translated into German, in 1912, by Emil Waltz.

Mr. B. Welbourn, who is this year's chairman of the Liverpool Sub-Centre of the Institution of Electrical Engineers, and delivers his address on November 6th, received his early technical training at King's College, London, at a time when the late Dr. John Hopkinson was Professor of Electrical Engineering there. He became an Associate of the College, and was appointed student demonstrator in the Siemens laboratory. Subsequently he became a pupil at the works of Messrs. Willans & Robinson, Thames Ditton, later securing the post of electrical engineer to the Electro-Chemical Co., Ltd., St. Helens. In 1900, Mr. Welbourn joined the contract department of the British Insulated Wire Co., Prescot, and from that time to the present day he has remained with the firm which is now, of course, the British Insulated & Helsby Cables, Ltd.; he has been contract manager for the past 20 years.

During the European war, Mr. Welbourn was a member of the Lancashire Anti-Submarine Committee. He has been closely identified with the development of paper-insulated cables for high-pressure work, and serves on various committees of the B.E.S.A. and B.E.I.R.A. Mr. Welbourn was vice-chairman of the Lancashire & Cheshire Linking-up Committee of Engineers, which published two reports that attracted a great deal of attention.

Mr. Welbourn is also familiar to our readers as a prominent and active member of the Institution. He has been a member of the Council for three years, and is a past-chairman of the Manchester Local Section. Among his contributions to electrical engineering literature are a paper on "British Practice in the Construction of Overhead Transmission Lines," and an address on "Electrolytic Copper as used for Electrical Work," delivered before the I.E.E., and a paper read before the Institution of Mining Engineers, on "Copper and Aluminium Overhead Lines and Insulated Cables." Mr. Welbourn is something of a "globe trotter" and has seen a great deal of Europe, Canada, and the United States.



Elliott & Fry [*London.*

Mr. B. Welbourn,
Chairman of the Liverpool Sub-Centre of the I.E.E.

At Fleetwood Council, on October 19th, it was decided that, subject to the electrical engineer and manager remaining for three years, the minimum scale of salaries recommended for chief electrical engineers by the National Association be adopted. Mr. W. Knowles moved the matter back, stating that when they saw other public bodies cutting down expenses and economising, he felt it was not a time for them to be increasing salaries. This motion, however, was defeated.

Mr. A. W. Gadsby, who has been 15 years chief supply salesman in the Sheffield area for the Metropolitan-Vickers Electrical Co., Ltd., has now been appointed supply leader for the Cardiff area of the company. Mr. Gadsby's duties in the Sheffield area have now been taken over by Mr. H. Girdlestone, lately with the British Thomson-Houston Co., Ltd.

It is stated by a Liverpool paper that Mr. Percival H. Powell has been appointed to the newly-created Chair of Electrical Engineering at the School of Engineering, Canterbury College, New Zealand. He was educated at the Liverpool College, and proceeded to Liverpool University, where he took the degree of B.Sc. with first-class honours in Engineering and afterwards obtained the degrees of M.Sc. and M.Eng. He was awarded a University Fellowship, a University Scholarship, and was the first holder of the "David Rew Memorial" Research Scholarship in Electrotechnics. He is a member of the Institution of Electrical Engineers and of the American Institute of Electrical Engineers.

Mr. A. E. Izant, having relinquished his position with the Metallic Electrical Engineering Co., Ltd., is shortly taking up the position of representative, on the South-East Coast, for the Cable Accessories Co., Ltd., Tipton, Staffs.

Mr. Victor Delebecque terminated his agreement as general manager of the Walsall Electrical Co., Ltd., Walsall, last week, after 12½ years' engagement. Mr. Delebecque informs us that he is now making other arrangements for manufacturing his specialities, and, pending these arrangements, communications for him should be addressed to Ash Villa, Sandwell Street, Walsall.

The Council of the British Cast Iron Research Association has offered the important position of Director of Research to the Association to Dr. Percy Longmuir, of Sheffield. He has accepted, and will take up his duties on November 1st.

On and after November 1st, the address of Mr. W. M. Selvey will be 66, Victoria Street, Westminster, S.W. 1. The new telephone number is "Victoria, 264."

Mr. W. J. Salaman, late director of the Millwall Engineering Co. and other companies, has joined Messrs. Henry Joseph & Co. as an active partner, and will have charge of sales and agencies.

Mr. G. Terrell, M.P., has been re-elected president of the National Union of Manufacturers.

Amongst the members of the new Cabinet, whose appointment the King approved on Tuesday, is Sir Philip Lloyd-Greame, president of the Board of Trade. Offices which remain to be filled are those of Postmaster-General, Minister of Transport, and director of the Overseas Trade Department.

Obituary.—Mr. Fernand Espir.—We regret to record the death, which occurred on October 18th at a nursing home, of Mr. Fernand Espir, of 3, East India Avenue, London, E.C. Mr. Espir, who was in his 59th year, was an importer of electrical wire and appliances, and was sole agent for the Tréfileries et Laminoirs du Havre and the Société Anonyme des Anciennes Usines de Fuisseux.

NEW COMPANIES REGISTERED.

Whiteside, Bloomfield & Co., Ltd. (185,016).—Private company. Registered October 13th. Capital, £500 in £1 shares. To carry on the business of manufacturers of, and dealers in motor accessories, wireless equipment, &c. The first directors are:—H. S. Whiteside, "Garrick Villa," Hampton-on-Thames; W. S. R. Bloomfield, 187, Oakwood Court, Kensington, W.14; R. Crook, 79, Manor Road, Richmond, Surrey. Registered office: 10, Lower John Street, Regent Street, W.

Auto-Bulbs, Ltd. (184,991).—Private company. Registered October 13th. Capital, £100 in £1 shares. To carry on the business of manufacturers, importers, and distributors of electric lamps, electric light fittings, and electrical appliances and apparatus, &c. The first directors are:—G. R. Boyle, 2, Chillingworth Gardens, Strawberry Hill, Middlesex (sales manager of Perm-a-Grip, Ltd.); Dorothy Montrose, 224, High Road, Lee, S.E.13. No qualification necessary. Secretary: C. Lazarus. Registered office: 14-17, Holborn Viaduct, E.C.

Newcastle Carbide Co., Ltd. (185,006).—Private company. Registered October 13th. Capital, £500 in £1 shares. To carry on the business of manufacturers of, and dealers in carbide of calcium and similar products or products arising therefrom, electro-chemical products and apparatus, electric plant, &c. The first directors are:—Mrs. E. A. Bingham, C. H. Bingham, and C. H. Bingham, Junr., all of 2, Kingswood Road, Upper Norwood, S.E. Registered office: Room 223, Mansion House Chambers, 11, Queen Victoria Street, E.C.

Bristol Carbide Co., Ltd. (184,993).—Private company. Registered October 13th. Capital, £500 in £1 shares. To carry on the business of manufacturers of, and dealers in, carbide of calcium and similar products or products arising therefrom, electro-chemical products and apparatus, electric plant, &c. The first directors are:—Mrs. E. A. Bingham, C. H. Bingham, and C. H. Bingham, Junr., all of 2, Kingswood Road, Upper Norwood, S.E. Solicitors: Chas. Bingham & Co., 11, Queen Victoria Street, E.C.

P. Adair, Ltd. (185,085).—Private company. Registered October 17th. Capital, £500 in £1 shares. To carry on the business of import and export merchants, consulting, mechanical, and electrical engineers, &c. The first directors are:—G. E. R. Adair, "Wellesley House," Sloane Square, S.W. (director of Adair, Wighton & Co., Ltd.); P. Adair, 65, Upper Gloucester Place, N.W.1 (director of Acme Radio Valve Co., Ltd.). Secretary: R. E. Wynn. Registered office: St. Andrew's House, 32-4, Holborn Viaduct, E.C.1.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Indian Electric Supply & Traction Co., Ltd.—Particulars filed of £250,000 debentures, authorised May 2nd, and covered by trust deed dated September 29th, 1922, charged on land in Cawnpore and the company's undertaking and property, present and future, including uncalled capital, but excluding certain specified premises, plant, machinery, &c., the whole amount being now issued. Trustees: Beaver Trust, Ltd.

Elliott Brothers (London), Ltd.—Satisfaction to the extent of £9,000 on October 6th, 1922, of debentures dated July 19th, 1916, securing £30,000.

Acme Engineering Co. (London), Ltd.—Debenture dated October 10th, 1922, to secure £500, charged on the company's property, present and future, including uncalled capital. Holder: J. Lowe, 43, Bloomsbury Square, W.C.

Madras Electric Supply Corporation, Ltd.—Particulars filed of £200,000 second debentures, authorised May 25th, and covered by trust deed dated September 29th, 1922, charged on the electricity undertakings and all purchase moneys payable on any purchase of such undertakings by the local authorities, government or otherwise, under the statutory powers, and the company's undertaking and property, present and future, including uncalled capital. The whole amount is now issued. Trustees: Beaver Trust, Ltd.

Kidderminster and District Electric Lighting and Traction Co., Ltd. (59,972).—Return dated July 6th, 1922. Capital, £100,000 in 5,000 pref. and 5,000 ord. shares of £10 each. 3,000 pref. and 4,700 ord. shares taken up. £77,000 paid. Mortgages and charges, nil.

Barnsley and District Traction Co., Ltd. (72,962).—Return dated July 5th, 1922. Capital, £100,000 in 50,000 pref. and 50,000 ord. shares of £1 each; 22,000 pref. and 20,035 ord. shares taken up. £42,035 paid. Mortgages and charges: £20,578 debenture stock and £29,000 second debentures. (According to balance-sheet dated December 31st, 1921, the £29,000 second debentures were issued to bankers as collateral security for overdraft.)

Lancashire Electric Light and Power Co., Ltd. (77,202).—Return dated May 31st, 1922. Capital, £789,838 in 499,975 first pref., 137,500 7 per cent. pref., and 152,363 ord. shares of £1 each. 465,000 first. pref., 137,500 7 per cent. pref., and 152,363 ord. shares taken up. £1 per share called up on the first and 7 per cent. pref., and 149,363 ord. shares. £751,813 paid, leaving £650 in arrears. £240 considered as paid on 2,400 ord. shares. Mortgages and charges, £685,000.

CITY NOTES.

Victoria Falls and Transvaal Power Co., Ltd.

The annual meeting was held on October 19th, when the Marquess of Winchester presided. The Chairman, in moving the adoption of the report and accounts, said that the share capital still remained at £3,000,000. The actual amount of first mortgage debentures outstanding was £1,721,630, but, following the usual practice, they had added the amount of debentures drawn for redemption, but which, up to the date of the balance sheet, had not been presented for payment, making the total figure £1,926,879. The second mortgage debentures stood at £1,201,881, £78,260 having been paid off during the year. The creditors and credit balances stood at £1,681,360, those in London amounting to £1,535,775, being chiefly in respect of sums owing for interest on debenture coupons uncollected and the necessary reserve for taxation. They had not considered it necessary to increase the reserve fund, which still stood at £250,000. Referring to the other side of the balance sheet, the leases and concessions, and the company's power stations, buildings, equipment and land, and the cost of acquisition of power contracts, stood at £1,377,614 and £1,737,044 respectively, a reduction of £80,124, due chiefly to the amount written off for depreciation. The company's loan to the Rand Mines Power Supply Co. and the 500,000 shares in this company stood together at £2,638,310, being a reduction of £101,602. The debtors and debit balances amounted to £98,639. Cash and investments were set out in detail, and amounted altogether to £2,182,137. Turning to the profit and loss account, the receipts amounted to £784,425, as compared with £808,419 last year. Depreciation and amounts written off, including the provision made for British taxation, amounted to £410,872. The net result for the year was a profit of £172,926, which had been carried to the balance sheet and added to the amount brought forward from the previous year, making the total balance to the credit of the profit and loss account £265,408. In respect of this balance the preference shareholders had received three dividends, two each of 3 per cent. and one of 4 per cent., all less income tax, and the ordinary shareholders had received a dividend of 5 per cent. less income tax in respect of the year 1921. These dividends absorbed £175,000, leaving a balance of £90,408, which had been carried forward to the current year. By far the most important matter affecting the company and the gold mining industry generally during the period under review was the strike of the employés at the mines, which embraced the employés of the company and the staffs of the Johannesburg engineering shops. The prospects of the present year were good. The business of the company was being well maintained, and the demands for power since May had exceeded those of the corresponding months last year. He was hopeful that there would not be any material difference in the profits as compared with last year's figures. The Electric Power Bill, to which he referred at the last meeting, was passed during the recent session of the Union Parliament. It was satisfactory to note the increasing output of gold from the Witwatersrand Mines. The average working costs for August, 1921, were 25s. 4d. per ton milled, but for August, 1922, the average costs amounted to 20s. 5d., a reduction of 4s. 11d. per ton milled. The average of 20s. had, therefore, nearly been realised, as against the pre-war level average of 16s. 8d. per ton milled. The net result of the economies which had been effected was that low-grade mines were now again able to work at a profit in spite of the premium on gold having largely disappeared. The matter of plant capacity and notified demands to date would necessitate the immediate purchase of two additional large machines, together with boilers and all auxiliaries, and this important business was now being dealt with. Until a final decision had been arrived at it was impossible to forecast whether these additions could be made out of funds still in hand, but he was hopeful that they could install the plant required for extension without any addition to capital.

Mr. A. E. Hadley formally seconded the resolution, and it was carried unanimously. The retiring directors, Lord Brabourne and Mr. F. Astley Cooper, were re-elected.

Eastern Extension, Australasia & China Telegraph Co., Ltd.

The annual meeting was held on October 18th, when Sir John Denison-Pender, G.B.E., K.C.M.G., presided. The Chairman mentioned with regret the recent death of the general manager and secretary, Mr. F. E. Hesse, whose association with the company dated back to its birth. In presenting the report, which was abstracted in our issue of October 13th, the Chairman said that in comparison with 1920 it would be seen that the amount placed to the general reserve fund had been increased by £50,000. The directors considered it advisable to make that further provision in order to meet expenditure in connection with the laying of new cables. They also considered that, in view of the decrease in traffic receipts, as evidenced by the returns for the first six months of the current year (the working expenses still being very high), it was expedient to carry forward the sum of £307,880 to the account for 1922. Further capital expenditure had been incurred during 1921 to the amount of £409,740, of which amount £280,265 represented the balance of the cost of the Madras-Singapore Direct Cable, and £129,475 new offices and houses for the staff, &c. The delays in the transmission of Far East and other traffics had been very greatly reduced; in fact, but for temporary misfortunes, such as interruptions of important sections, it might be said that after taking into consideration the volume of traffic to be carried, transmission had been quite satisfactorily dealt with. The new cable between Madras and Singapore was successfully laid and opened for traffic on April 18th, 1921. A contract had since been entered into with the Telegraph Construction & Maintenance Co. for the manufacture of a cable to be laid between Colombo and Penang, which they hoped to have working in April next. When that had been effected it was confidently hoped that they would be in a position to give a good and fast service to the Far East by having a margin in cable capacity in the event of temporary interruptions. There were, perhaps, two or three important sections which it would be advantageous to strengthen at a future date, and that would not be lost sight of by the directors. The work of installing automatic apparatus was being pressed on as much as possible; this, it was hoped, would eventually lead to a reduction in working expenses. During the past year such apparatus had been installed and successfully worked at their Cocos Station, whereby a reduction of seven operators was effected. Owing to the increased number of cables now in operation at Singapore, and to the additional space required for new apparatus, they had been obliged to undertake the construction of a new office at that station, which it was hoped would be completed and occupied in about 18 months from date. It had also been found necessary to provide new offices at Melbourne and Sydney, and properties had been purchased and plans for the reconstruction of the buildings were under consideration.

Colonel the Hon. Arthur G. Brodrick, T.D., A.D.C., seconded the Chairman's motion, which was carried.

Sir John Denison-Pender and Mr. J. H. Wilson were re-elected directors of the company.

Amalgamated Wireless (Australasia), Ltd.

The net profit for the year ended June 30th was £9,251, which, with £2,180 brought forward, made an available total of £11,431, as compared with £11,839. A dividend of 6 per cent. absorbed £11,136, and £296 was carried forward. The gross profits showed an increase of £4,059, but working expenses rose in greater proportion. The agreement with the Commonwealth Government necessitated increasing the capital to £1,000,000 by the issue of 800,000 £1 shares. The Commonwealth took 500,001 of these, and 2s. has been paid upon each of the new shares. The Government undertakes to bear, for three years, any loss in the working of the stations taken over.

Marconi's Wireless Telegraph Co., Ltd.

An extraordinary general meeting was held on October 20th, to consider resolutions for increasing the capital to £4,000,000 by the creation of 1,000,000 new ordinary shares of £1 each, and for extending the borrowing powers of the directors from one-half up to the total nominal capital for the time being. Signor Marconi presided, and in proposing the resolutions said that the development of wireless telegraphy throughout the world was making very great progress, and a number of important stations were being, or had yet to be built. To ensure efficient working, avoidance of interference, and provide the highest degree of economy, both in the matter of construction, and subsequently in the conduct of the telegraph services, the Radio Corporation of America, the Compagnie de Telegraphie Sans Fil, of Paris, the Telefunken Co., of Berlin, and their company, had joined together to erect those stations in many foreign countries. At Buenos Aires, in the Argentine Republic, a station was in the course of erection, and it was hoped would be opened for service about May 1st next. In Brazil similar work had been commenced. At Bogota, Colombia, a service would be opened very shortly, the station having been recently completed. Other arrangements were in course of negotiation, and direct telegraph services would shortly be established between the several South American Republics and Central America, and also from the South American Republics and Central America to the United States of America, the principal capitals of Europe, and, by relays, from these to almost every part of the world. The capital of the company in Australia had been increased and the Australian Government was taking a considerable share interest. The company was to construct a station for direct service with this country. They were taking a substantial part in that company. They had also signed an agreement with the Government of the Union of South Africa to create a direct wireless telegraph service between South Africa and this country. Very big developments were taking place in Canada, in which they would be taking part with the Canadian company. They had also signed an agreement with the Austrian Government to take over the existing wireless telegraph stations in Austria and to construct additional stations for the purpose of conducting telegraph services with foreign countries. There were a number of very important arrangements which by now might be completed or on the eve of completion, particulars of which he regretted he could not give at the moment, but he had told them sufficient to satisfy them of the progress which the company was making and the considerable building programme which they had in front of them, both at home and abroad. In addition, however, to the construction of telegraph stations, they had the advent of broadcasting. That was an entirely new business, which they had every reason to believe would assume very big dimensions, and add very considerably indeed to the earning powers of the company. Not only was broadcasting proceeding at home, but likewise it was going ahead in most other important capitals of the world; thus they had to make provision for very considerable manufacture, both for home and for foreign requirements. That was a business which, according to their present estimates, would keep a sum of approximately seven or eight hundred thousand pounds more or less continuously and profitably employed for some time to come. In these circumstances they would no doubt all appreciate that additional capital must be found, and, therefore, it was that they were asking for the necessary authority to provide the moneys which were required. They intended to issue short-term debenture stock, giving to the holders a right to convert it into ordinary shares of the company at any time prior to April 1st, 1929, at the rate of £3 of stock for one ordinary share. Their view was that that was the most economical and the most satisfactory way of raising additional capital at the moment. A substantial part of the money raised would be employed for some time in construction work, and would, therefore, of course not be immediately productive of profit. The broadcasting business, however, should more than compensate. He wanted to make it perfectly clear that while they were increasing the capital of the company there would be no issue of these shares—they would be held for the purpose of giving to the debenture holders the right of conversion.

Mr. Godfrey Isaacs, in seconding the motion, said they had had questions from shareholders asking what had been done with the moneys subscribed in 1918. In that year the share capital and premiums received amounted to £4,157,599, and on December 31st in the same year the excess of assets over liabilities amounted to £3,548,346. At the end of 1921 the excess of assets over liabilities amounted to £7,961,946—a difference approximately of £4,400,000, or some £250,000 more than the amount which they had issued. During the period from 1918 to 1921 inclusive they had distributed dividends and bonuses amounting to £1,938,901. The present shareholders would have the right of preferential allotment up to one-half of the issue of debentures.

The resolutions were carried.

Electric Supply Co. of Victoria, Ltd.—The directors' report for the year ended March 31st, 1922, states that the lamps connected increased from 312,520 to 329,242, and that the tramway passengers carried fell from 6,096,269 to 6,035,062. The trading account shows a gross profit of £40,108, against £39,699. The balance to the credit of profit and loss account is £38,980, plus £43,585 brought forward, making £82,565. Deduct debenture interest, £5,333; debenture stock redemption, £8,889; written off cost of debenture issue, £450; provision for British corporation profits tax, £1,350; leaving a balance of £66,542. Out of this it is proposed to pay the preference dividend for the two years ended March 31st, 1922, £21,000; and to carry forward £45,542. The directors wish to direct the particular attention of the shareholders to the considerable sums payable for income tax for the year under review. These in Australia, and this country, plus British Corporation profits tax, will exceed £10,000. The directors, therefore, regret that they are unable to recommend a dividend upon the ordinary share capital.

Prospectuses.—*London Underground Railways.*—A prospectus was advertised toward the end of last week offering for issue 4½ per cent. debenture stock in the London Electric Railway Co., the City & South London Railway Co., and the Central London Railway for the following amounts respectively: £2,250,000, £1,250,000 and £458,000. The list of applications was to close by Tuesday last; the amount required was, however, over-subscribed within 24 hours.

The Mediterranean Asbestos Quarries, Ltd.—On Monday last the daily Press contained a prospectus statement concerning this company and its objects. The statement was not an invitation to apply for shares, but merely for Stock Exchange purposes. The company acquires certain concessions in the Island of Corsica for the purpose of quarrying, transporting, marketing, and dealing in asbestos. Among the directors is Mr. D. N. Dunlop, M.I.E.E., director of the British Electrical and Allied Manufacturers' Association.

Power Securities Corporation, Ltd.—This company's prospectus, which is to be issued next Monday, will offer 500,000 pref. shares (7 per cent. cum. participating) of £1 each and 100,000 ordinary shares at 22s. each. The company has acquired the whole of the ordinary capital in Balfour, Beatty and Co., Ltd., but the constitution of the latter will remain unaltered. 400,000 of the Corporation's ordinary shares have been subscribed for by Sir W. G. Armstrong, Whitworth and Co., Ltd., Babcock & Wilcox, Ltd., the British Thomson-Houston Co., Ltd., the directors of Balfour, Beatty & Co., Ltd., and the directors of the new corporation.

Sir W. G. Armstrong, Whitworth & Co., Ltd.—Sir Glyn H. West, presiding at the annual meeting on October 19th, said that the past year had been the most trying one in the history of the company; the profit had been satisfactory in the circumstances. The company had probably the best organised hydro-electric department in the country, and was negotiating with considerable hope of success for more than one large contract, which would bring a considerable amount of work to both Elswick and Openshaw. Moreover, when hydro-electric energy was used for paper-making there was the additional advantage of supplying the paper-making machinery itself; for this purpose works had been acquired in Bury.

Fuller's United Electric Works, Ltd.—By order of the High Court, Chancery Division, separate meetings will be held at Winchester House, Old Broad Street, E.C., on November 9th, of the holders of the 7 per cent. short-term notes; unsecured creditors other than preferential creditors and other than creditors for under £10; the holders of preference shares; and the holders of ordinary shares, for the purpose of considering and if thought fit approving a scheme of arrangement.

Automatic Telephones (Australasia), Ltd.—The net profit for the year ended June 30th last was £8,463, and the balance brought forward gave an available total of £10,703. Of this £6,250 was absorbed by a 10 per cent. dividend and £4,452 was carried forward. In anticipation of large orders in the near future the company has decided to issue the balance of unsubscribed capital, £37,500.

Weymouths, Ltd. (Victoria).—The report for the year ended June 30th of this company, in which the English Electric Co., Ltd., holds an interest, shows a net profit of £6,593, as against £7,373, on a capital of £52,500. A dividend of 10 per cent., absorbing £5,250, was again distributed, £1,283 was transferred to reserve, and £60 carried forward. A bank overdraft of £11,536 was extinguished during the year.

Erinoid, Ltd.—The trading profits for the year ended August 31st last were £27,935. After allowing for depreciation, &c., the net profits were £13,222. Deducting debit of £9,719 brought forward, £3,503 remains to carry forward. During the last six months of the company's year there was a marked increase in sales, which still continues, and prospects for the ensuing year are stated to be most promising.

Montreal Power Companies.—The Montreal Light, Heat, and Power Co. is paying a quarterly dividend of 2 per cent. on the common shares, and the Montreal Light, Heat, and Power Consolidated Co. one of 1¼ per cent. Both are payable on November 15th.

The Swiss Oerlikon Works.—The accounts of the Maschinenfabrik Oerlikon, of Oerlikon, show net profits of 1,810,000 fr. for 1921-21 as compared with 1,890,000 fr. in the previous year, and the dividend is at the same rate of 8 per cent.

Reduction of Capital.—Southern Brazil Electric Co., Ltd., and Reduced.—A petition for the confirmation of the reduction of the capital of the company from £750,000 to £425,000 has been presented to the High Court, Chancery Division, and will be heard by Mr. Justice Lawrence on November 7th.

Brampton Bros., Ltd.—Dividend of 10 per cent., free of tax, on the ordinary shares; to reserve, £10,000; carried forward, £8,236.

Callender's Cable & Construction Co., Ltd.—Interim dividend at the rate of 5 per cent. per annum on the ordinary shares, less tax.

Montevideo Telephone Co., Ltd.—Final dividend of 5 per cent., free of tax, making 8 per cent. for the year.

Babcock & Wilcox, Ltd.—Interim dividend of 8 per cent., tax free, compared with 7 per cent. last year.

STOCKS AND SHARES.

Tuesday Evening.

Dramatic developments in the political world have made little difference to Stock Exchange markets. Men engaged in business always regard a General Election as being something of a nuisance. If it has got to be, then the sooner it is over the better. The prospect of the campaign being short and intensive is therefore welcome, and the immediate result of the possibility of a change of Government was a rise in the price of the War Loan, reflected as usual in other investment securities round the Stock Exchange. Publication of the terms of the Southern railway grouping arrangements caused activity in the stocks affected; the Home Railway electric stocks are better. Last Friday's meeting of the Marconi company caused no particular changes in the prices of the company's shares. Electricity supply issues are all very steady. Another heavy drop in the value of the franc adversely affected anything connected with Continental interests.

The County of London Electric new ordinary shares hardened to 4s. 3d. premium, but reacted a trifle. Vague hints are current with regard to certain developments said to be pending in connection with the company's business, though what these may be diligent inquiry has failed to elicit. The existing ordinary shares are better at 29s.; the new preference drooped to 1s. 9d. premium. Another rise of 2s. 6d. lifted Charing Cross ordinary to 7½. City of London ordinary at 2 1/16 are better.

How a small electricity company may be handicapped by limited conditions, the experience of the Guildford Electricity Supply Company abundantly demonstrates. In 1920, the shareholders sold their undertaking to the municipality, and the final payment in respect of their shares has just been made. Preference and ordinary alike receive 8s. 6¾d. in the pound. The preference having no priority rights, they get the same as the ordinary. It had been pretty generally expected that 10s. a share would have been available for both classes. But the whole business is disappointing, and demonstrates the necessity that there is for the Electricity Commissioners to formulate some scheme whereby central stations can supply energy to a number of districts without the latter being called upon to provide their own facilities for supply.

The principal movements of this week in our lists are substantial rises in the stocks and shares of the Eastern cable group. Eastern Extensions, Westerns, and Globes are all about 12s. 6d. higher and a corresponding rise of 5½ points has put up Eastern Telegraph ordinary stock to 193. This makes forcible reply to the fear of those who saw in the extension of broadcasting the possibility of a blow to the cable companies. It is unnecessary to emphasise the continual recommendation of the stocks and shares in this column for several years past, the counsel being based upon the financial strength of the companies and the sound management which carried them so skilfully across the difficult war period. The fact of the dividends being paid free of tax renders the stocks worth holding even after the rises of the last three or four weeks, and, so far as can be seen at present, there is nothing to stop further improvements to £20 for the trio of shares and 200 for the Eastern Telegraph stock.

Marconis have been a dull market since the meeting last Friday, when the terms of the debenture issue were not announced. Evidently the shareholders do not like the idea of having this large slice of new capital placed in front of the existing shares. There has been very little selling, but at the same time further support was not rendered. Canadians however, are a good market at 11s. 3d. and Radio Common maintain their rise.

Ready subscriptions awaited the new issues of Tube debenture stocks made last week. The lists were closed in advance of the advertised time, and it was generally assumed that there would be a premium on the stocks when dealings started. However, some of the allottees apparently applied for more stock than they wanted, because, instead of the premium, a slight discount developed, though this quickly disappeared, and the quotations are all at par, *i.e.*, the issue price of 98. Underground income bonds are better at 87½. Metropolitan ordinary rose 2½ and Districts 1½, the former keeping time with a sharp rise in Great Western ordinary. Prior-charge stocks hold their rises of last week.

United River Plate Telephone shares show a rise of 10s. at 7⅞, in consequence of the announcement that the company has now authority to revise its rates. Orientals at 2 5/16, are nominally 1/16 down, most of which is accounted for by the dividend deduction. Chile Telephones at 6½ are a fraction up.

Amongst manufacturing shares, rises to 14s. 6d. in India Rubbers and to 44s. 6d. in British Insulated ordinary stand out prominently. Callenders and Henleys keep their prices, and the market as a whole is a good one. In the electricity manufacturing group, few changes of any consequence have occurred. Babcock and Wilcox advanced substantially, on the increase in the dividend. At 3½ xd. the price exhibits a gain of practically 5s. on the week. There has been an eager demand for the shares from the North.

Brazilian Tractions soon lost the couple of points which they annexed on declaration of the quarterly dividend of 1 per cent. Owing to the slump in the franc, orders to sell Brazilian Tractions came from the Continent, and the price has reacted to 47. Although there is nothing going on in Mexicans and other foreign descriptions, the tendency is dull, by reason of the drop in the French Exchange.

Rubber shares took on a new lease of life, and prices went ahead very considerably—too sharply, as it afterwards turned out, because a good deal of profit-taking ensued, which failed to encounter the expected support from fresh buyers. Therefore the market is quieter, although speculation looks for a fresh advance in the shares owing to the price of the raw produce having risen to a shade over 1s. per lb. There is nothing new to report in connection with the market in armament shares.

SHARE LIST OF ELECTRICAL COMPANIES.

	Dividend 1920.	Dividend 1921.	Price Oct. 24, 1922.	Rise or fall.	Yield p.c.
Home Electricity Companies.					
Brompton Ordinary	12	12	8½	—	£7 1 2
Charing Cross Ordinary	8	9	7⅞	+ ½	5 18 0
do. do. 4½ Pref.	4½	4½	4	—	5 12 6
Chelsea	6	6	6½	—	4 12 4
City of London	14	14	2 1/16	+ 3/32	6 15 7
do. do. 6 per cent. Pref.	6	6	23/-	—	5 4 4
County of London	8	8	1 5/16	—	5 11 4
do. do. 6 per cent. Pref.	6	6	1⅛	—	5 4 4
Kensington Ordinary	9	10	7½	—	6 13 4
London Electric	2½	4	2⅝	—	4 11 5
do. do. 6 per cent. Pref.	6	6	5	—	5 17 1
Metropolitan	7	7	6½	—	5 12 0
do. 4½ per cent. Pref.	4½	4½	4	—	5 12 6
St. James' and Pall Mall	12	12	9½	—	6 11 6
South London	7	7	4	—	7 0 0
South Metropolitan Pref.	7	7	1 3/16	—	5 18 0
Westminster Ordinary	10	10	7½	—	6 9 0
Telegraphs and Telephones.					
Anglo-Am. Tel. Pref	6	6	101xd	—	5 18 10
do. Def.	1½	84/6	23½	—	7 8 —
Chile Telephone	6	6	6½	+ ⅛	4 18 0
Cuba Sub. Ord.	7	7	8½xd.	—	8 12 4
Eastern Extension	10	10	19⅝	+ ⅜	5 3 3
Eastern Tel. Ord.	10	10	199	+6½	5 3 6
Globe Tel. and T. Ord.	10	10	19⅝	+ ⅜	5 3 3
do. do. Pref.	6	6	11½	—	5 4 4
Great Northern Tel.	24	22	28	— ½	7 17 2
Indo-European	10	10	35½xd	+ ½	7 1 0
Marconi	25	15	2⅜	— 1/16	6 6 4
Oriental Telephone Ord.	12	12	2 5/16 xd	—	*5 4 0
United R. Plate Tel.	8	8	7⅞	+ ⅛	*5 16 0
West India and Panama	Nil	Nil	8/-	—	Nil
Western Telegraph	10	10	19⅜	+ ⅝	*5 3 3
Home Rails.					
Central London Ord. Assented	4	4	87	—	5 19 5
Metropolitan	1½	2½	55	+2½	4 5 9
do District	Nil	1	41½	+1½	2 10 0
Underground Electric Ordinary	Nil	Nil	3⅛	—	Nil
do. do. "A"	Nil	[Nil	7/6	—	Nil
do. do. Income	2	4	b7½	+1	*4 11 5
Foreign Trams, &c.					
Anglo-Arg. Trams. First Pref.	6½	12½	8⅜	—	7 11 9
do. do. 2nd Pref.	Nil	6½	8½	—	7 2 0
do. do. 5 per cent. Deb.	5	5	80½	—	6 4 3
Brazil Tractions	Nil	Nil	47	— 2	8 10 2
British Columbia Elec. Rly. Pcs.	5	5	76½	—	6 9 9
do. do. Preferred	5	93/-	68	—	*7 0 0
do. do. Deferred	8	194/-	71½	—	*8 12 6
do. do. Deb.	4½	4½	73	—2	5 16 5
Mexico Trams. 5 per cent. Bonds	Nil	Nil	72½	—	7 1 10
do. do. 6 per cent. Bonds	Nil	Nil	48½	—	Nil
Mexican Light Common	Nil	Nil	19½	—	Nil
do. Pref.	Nil	Nil	49½	—	Nil
do. 1st Bonds	Nil	5	65½	—	7 14 6
Manufacturing Companies					
Babcock & Wilcox	15	16	3½xd	+ ½	4 18 6
British Aluminium Ord.	10	5	17/9	—	5 12 8
British Insulated Ord.	15	15	44/6	+ 1/16	6 14 10
Callenders	15	15	1½	—	6 13 4
do. 6½ Pref.	6½	6½	1½	—	5 16 7
Crompton Ord.	10	5	12/-	—	6 18
Edison-Swan	10	Nil	3/-	—	Nil
do. do. 5 per cent. Deb.	5	5	64	—	7 16 4
Electric Construction	10	10	25/6	—	7 17 0
English Electric	8	8	15/0	—	6 7 0
do. do. Pref.	6	6	18/9	—	6 8
Gen. Elec. Pref.	6½	6½	21/3	—	6 2 4
do. Ord.	10	5	18/6	—	5 8 1
Henley	15	15	2½	—	6 9 10
do. 4½ Pref.	4½	4½	4⅜	—	5 2 10
India-Rubber	10	—	14/6	+9d.	—
Met.-Vickers Pref.	8	8	8¼	—	6 14 9
Siemens Ord.	10	10	25/9	—	*7 15 4
Telegraph Con.	20	20	20½	—	*4 13 6

*Dividends paid free of Income Tax.

THE INDUSTRIAL SITUATION IN JAPAN

(With Statistics of Electrical Imports and Exports).

The Department of Overseas Trade has recently issued a report by Sir E. T. F. Crowe (H.M. Commercial Counsellor) and Mr. G. B. Sansom (H.M. Commercial Secretary), of Tokio, on the commercial, industrial and financial situation in Japan during 1921 and up to June 30th, 1922.

Probably the most interesting section is that dealing with high production costs, for, as the report remarks, many people outside Japan still regard it as a cheap country. The case of copper is very instructive on this point, and of particular moment to the electrical engineer. It illustrates clearly the changes which have taken place in the costs of production in Japan, while it also shows that up to the present, far from reducing prices, the action which has been taken has tended to maintain or even enhance them.

From Copper Producer to Importer.

Japan is one of the largest producers of copper in the world. Up to recent times she ranked fifth in the list. Before the war her output averaged 60,000 tons a year, and for the last 20 years or so she had been exporting about £2,500,000 every year. Next to silk and cotton yarns, copper was her most important export. The principal mines were owned by a few of the richest families in the country, and the copper business was looked upon as very prosperous and remunerative. In 1919 and 1920 imports of copper appeared for the first time, the values being as high as 26,000,000 yen and 22,000,000 yen respectively. Consumption in Japan had increased while production had fallen off owing to increased costs.

In 1921 the import continued, but on a much smaller scale, the total being only 8,000,000 yen, which, however, was larger than the export. In 1922 the business began once more to assume big proportions, and for the first four months the import of copper ingots was no less than 270,000 piculs, valued at 10,225,000 yen, while an entirely new trade was started in waste brass, of which 223,000 piculs, valued at 5,500,000 yen were imported.

The copper mine-owners declared that they were unable to produce copper at a price which could compete with the imports from America, and the Government, in order to protect an important domestic industry, increased the duty from 1.20 yen per 100 kin to 7 yen. For a short period imports ceased but in June imports were again beginning to come in.

It is estimated that consumption in Japan is about 6,000 tons a month, while production has dropped below 5,000 tons. In 1917 Japan produced on an average 10,000 tons monthly. The problem facing mine-owners is whether to attempt to produce copper more economically and meet competition or to maintain the price at a high level by reducing output.

The latter uneconomic policy has been followed by the colliery owners who curtailed output by 17½ per cent. in order to bolster up prices. It is this tendency, the report rightly points out, of continually forcing up prices and preventing them from finding their natural level which must seriously damage Japanese trade unless it is remedied in time. The immediate effect has naturally been to keep the cost of living at the high level to which it mounted during the war.

Fewer Competitive Exports.

Japan's competitive power in foreign markets has consequently suffered. Her export trade has maintained its value by reason principally of her predominance as a world supplier of silk. Other branches, including even shipments of cotton tissues, have decreased considerably. Meanwhile, her purchasing power seems to have diminished but little, although there are signs that a fall will soon commence.

But there seems to be an excellent future in Japan for the British electrical engineer, whether it be in selling the larger and more complicated machinery and apparatus, not yet successfully made in the country, or in organising the manufacture there of the simpler goods. Great encouragement may be derived from the order placed with the English Electric Co. by the Imperial Government Railways for 34 electric locomotives.

Electrical Programme.

There is a vast programme of railway electrification which remains to be completed, and a number of hydro-electric combines have large power schemes in hand. A feature of the latter is the inclusion of storage plants requiring large and high dams. These plants would be run in parallel with a system of ordinary river plants and will supply the necessary power during the months when water is scarce, thus increasing the supplying capacity.

The Imperial Government Railways have adopted a ten years' improvement and extension scheme in pursuance of which they intend to construct 331 miles of road this year. One of the most notable undertakings in this direction is the submarine tunnelling at Shimonoseki. Experts have been engaged in studying the formation of the sea beds in the Straits and drawing plans which have at last been completed. In accordance with these plans, the railway authorities have decided to start work shortly and completion is expected by 1928 at an estimated cost of 18,000,000 yen. The tunnel, when constructed, will extend four miles. Another important undertaking to be started this year is the electrification of the Tokio-Yokosuka-Odawara lines. This work is to be completed by the end of the next fiscal year.

The following estimates have been approved by the Imperial Diet:—Construction expenses, 67,739,200 yen; improvement expenses, 123,742,529 yen.

Sir E. T. Crowe does not devote much space to describing the iron and steel situation, which is of considerable interest to the electrical and allied trades. The subject was dealt with fairly exhaustively in a recent issue of *Commerce Reports*, where it was pointed out that Japan has made rapid strides in its wire manufacturing industry, and to-day is turning out wire rope, plain wire, and wire nails of good quality. The production of these commodities, however, is not sufficient to meet the needs of the Japanese, resulting in heavy purchases of foreign wire goods. The demand for wire products is principally in galvanised plain and bright wire and wire nails. To a less extent there is a call for wire rope and cable, insulated wire and cable, woven wire fencing, wire cloth and screening. The Japanese demand for wire manufactures is best presented by figures. In the five months ended May this year the Japanese market received from the United States 21,995 tons of galvanised plain wire, 15,527 tons of wire nails, 3,951 tons of bright wire, 131 tons of wire rope and cable, 148 tons of insulated wire and cable, 24 tons of wire fencing, 20 tons of wire cloth and screening, 122 tons of other nails (including tacks), and 1,108 tons of miscellaneous wire manufactures. Receipts in this period also included 322 tons of cut nails and 40 tons of horseshoe nails.

Boiler plates for the Japanese-made locomotive, war vessel, steamship, and other equipment are largely imported. In May of this year 1,839 tons of boiler plates and 2,189 tons of other steel plates of American manufacture were taken by the Japanese.

Steel Materials for Electrical Machinery.

Japan has also made great strides in electrical work and is turning out small motors and motor fans in sufficient quantities to preclude imports. Large machines in quantity, as well as transformers, are likewise manufactured. Hydroelectric power schemes comprise perhaps the greatest activity among present-day undertakings. Three of the big power companies have merged, and when the projects undertaken are completed, the four cities on the island of Honshu—Tokio, Kyoto, Osaka, and Kobe—will have bountiful supplies of electric power for their lighting and industrial needs. This activity has resulted in an increased demand for the steel materials required in electric power transmission and electrical machinery. Light structural shapes for transmission towers, electric cables, tinned armature binding wire, and electrical sheets (armature and transformer sheets) are the principal products of steel entering into this work. Transmission towers fabricated in the United States have been shipped, knocked down, in heavy tonnages in the past two years. Steel and aluminium cables have also been purchased from American manufacturers. It is estimated that the normal consumption of electrical sheets for transformers, dynamos, and motors, is in the neighbourhood of 10,000 tons in a year. There are 20 or more Japanese factories in which these sheets are used. In recent years about 80 per cent. of the sheets used in the electrical industry were of American manufacture. The American product runs more uniform in quality and thickness, and is therefore in great favour among the Japanese. In addition, states *Commerce Reports*, the Japanese market offers attractive opportunities for the so-called specialities, among which might be mentioned airplane wire, music wire, umbrella wire, galvanised telegraph and telephone wire, flat steel wire for clock springs, strip steel, box bands, cold-drawn screw stock, shafting, metal lath, expanded metal mesh, sheet steel piling, ammonia cylinders, and copper rail bonds.

The following statement shows the import and export trade of Japan in 1920 in electrical and similar goods. For purposes of comparison, figures for 1919 have been added, together with a note of increases or decreases.

IMPORTS.

Country whence imported	1919 Yen	1920 Yen	Inc. or dec. Yen
Posts and materials for electric lines:—			
United States	151,000	84,000	– 67,000
Submarine telegraph or telephone cables.—			
United Kingdom	—	1,613,000	+1,613,000

Country whence imported	1919 Yen	1920 Yen	Inc. or dec. Yen
Insulated electric wire (metal armoured).—			
Total	71,000	1,000	– 70,000
United States	3,000	1,000	– 2,000
United Kingdom	68,000	—	– 68,000
Insulated electric wire, other.—			
Total	145,000	145,000	—
United States	145,000	140,000	– 5,000
Ammeters and voltmeters.—			
Total	253,000	309,000	+ 56,000
United Kingdom	1,000	4,000	+ 3,000
United States	250,000	301,000	+ 51,000
Wattmeters.—			
Total	519,000	306,000	– 213,000
United Kingdom	6,000	4,000	– 2,000
Switzerland	198,000	—	– 198,000
United States	292,000	173,000	– 119,000
France	21,000	93,000	+ 72,000
Accumulators.—			
Total	100,000	82,000	– 18,000
United Kingdom	3,000	—	– 3,000
Sweden	—	5,000	+ 5,000
United States	97,000	68,000	– 29,000
Telegraphic and telephonic instruments and parts.—			
Total	265,000	586,000	+ 321,000
United Kingdom ...	5,000	22,000	+ 17,000
France	8,000	3,000	– 5,000
Denmark	3,000	5,000	+ 2,000
United States	247,000	535,000	+ 288,000
Steam Boilers and parts.—			
Total	8,335,000	6,680,000	–1,655,000
Kwantung Province ...	6,000	1,000	– 5,000
United Kingdom	2,636,000	2,929,000	+ 293,000
United States	5,626,000	3,358,000	–2,268,000
Italy	2,000	226,000	+ 224,000
Steam turbines.—			
Total	836,000	1,701,000	+ 865,000
United Kingdom	—	91,000	+ 91,000
United States	558,000	1,521,000	+ 963,000
Switzerland	152,000	79,000	– 73,000
Steam Engines.—			
Total	540,000	491,000	– 49,000
United Kingdom	121,000	222,000	+ 101,000
United States	367,000	170,000	– 197,000
Italy	—	98,000	+ 98,000
France	35,000	—	– 35,000
Gas engines, petroleum engines, and hot-air engines.—			
Total	966,000	4,771,000	+3,805,000
United Kingdom	38,000	3,254,000	+3,216,000
Sweden	160,000	44,000	– 116,000
United States	757,000	818,000	+ 61,000
France	—	604,000	+ 604,000
Water turbines and Pelton wheels.—			
Total	1,787,000	779,000	–1,008,000
United Kingdom ...	637,000	—	– 637,000
France	355,000	41,000	– 314,000
Switzerland	778,000	91,000	– 687,000
Sweden	—	134,000	+ 134,000
United States	15,000	460,000	+ 445,000
Dynamos, motors, transformers, &c.—			
Total	5,245,000	6,080,000	+ 835,000
Kwantung Province ...	10,000	3,000	– 7,000
United Kingdom	187,000	376,000	+ 189,000
Sweden	292,000	975,000	+ 683,000
United States	4,763,000	5,485,000	+ 722,000
Dynamos combined with motive machinery.—			
Total	736,000	684,000	– 52,000
Kwantung Province ...	105,000	—	– 105,000
Sweden	199,000	—	– 199,000
United States	431,000	529,000	+ 98,000
Filaments for incandescent lamps.—			
Total	119,000	112,000	– 7,000
United Kingdom	15,000	24,000	+ 9,000
France	13,000	12,000	– 1,000
United States	89,000	65,000	– 24,000
Carbon for electrical use :—			
Total	682,000	583,000	– 99,000
United Kingdom	50,000	25,000	– 25,000
France	4,000	—	– 4,000
United States	627,000	534,000	– 93,000
Incandescent electric lamps.—			
Total	72,000	29,000	– 43,000
United Kingdom	1,000	8,000	+ 7,000
United States	70,000	21,000	– 49,000

EXPORTS.

Country to which exported	1919 Yen	1920 Yen	Inc. or dec. Yen
Electrical machinery and parts thereof.—			
Total	4,443,000	5,211,000	+ 768,000
China	1,409,000	1,326,000	– 83,000
Kwantung Province ...	1,687,000	1,468,000	– 219,000
Hong Kong	66,000	67,000	+ 1,000
British India	134,000	172,100	+ 38,000
British S.S....	35,000	52,000	+ 17,000
Dutch India	446,000	338,000	– 108,000
French Indo-China ...	33,000	10,000	– 23,000
Asiatic Russia	160,000	77,000	– 83,000
Philippine Islands	43,000	44,000	+ 1,000
Siam	39,000	10,000	– 29,000
United Kingdom	72,000	530,000	+ 458,000
France	39,000	89,000	+ 50,000
United States	6,000	16,000	+ 10,000
Canada	5,000	30,000	+ 25,000
Chile	17,000	11,000	– 6,000
Argentine	9,000	47,000	+ 38,000
Egypt	7,000	17,000	+ 10,000
Cape Colony and Natal...	24,000	11,000	– 13,000
Australia	155,000	707,000	+ 552,000
New Zealand	27,000	108,000	+ 81,000
Peru	5,000	1,000	– 4,000
Brazil	—	11,000	+ 11,000
Telephones and parts thereof.—			
Total	630,000	641,000	+ 11,000
China	143,000	112,000	– 31,000
Kwantung Province ...	218,000	277,000	+ 59,000
Hong Kong	1,000	—	– 1,000
British India	5,000	—	– 5,000
Dutch India	36,000	1,000	– 35,000
Asiatic Russia	220,000	247,000	+ 27,000
Electric lamps.—			
Total	1,677,000	2,145,000	+ 468,000
China	456,000	293,000	– 163,000
Kwantung Province ...	196,000	162,000	– 34,000
Hong Kong	145,000	92,000	– 53,000
British India	39,000	33,000	– 6,000
British S.S.	17,000	7,000	– 10,000
Dutch India	39,000	14,000	– 25,000
French Indo-China ...	19,000	18,000	– 1,000
Asiatic Russia	60,000	10,000	– 50,000
Siam	23,000	16,000	– 7,000
United Kingdom	3,000	3,000	—
France	11,000	14,000	+ 3,000
Italy	65,000	112,000	+ 47,000
United States	351,000	951,000	+ 600,000
Canada	54,000	263,000	+ 209,000
Peru	13,000	22,000	+ 9,000
Chile	20,000	27,000	+ 7,000
Argentine	1,000	8,000	+ 7,000
Brazil	1,000	—	– 1,000
Egypt	26,000	14,000	– 12,000
Cape Colony and Natal...	9,000	—	– 9,000
Australia	66,000	9,000	– 57,000
New Zealand	10,000	—	– 10,000
Philippine Islands	34,000	50,000	+ 16,000
Insulated electrical wire.—			
Total	8,411,000	8,043,000	– 368,000
China	1,445,000	3,863,000	+2,418,000
Kwantung Province ...	1,444,000	1,494,000	+ 50,000
Hong Kong	203,000	149,000	– 54,000
British Indies	195,000	328,000	+ 133,000
British S.S.	135,000	41,000	– 94,000
Dutch India	1,660,000	926,000	– 734,000
French Indo-China ...	51,000	77,000	+ 26,000
Asiatic Russia	906,000	436,000	– 470,000
Philippine Islands	23,000	3,000	– 20,000
Siam	96,000	117,000	+ 21,000
United Kingdom	—	1,000	+ 1,000
United States	6,000	25,000	+ 19,000
Peru	110,000	7,000	+ 103,000
Chile	111,000	207,000	+ 96,000
Argentine	367,000	137,000	– 230,000
Brazil	14,000	81,000	+ 67,000
Egypt	20,000	30,000	+ 10,000
Cape Colony and Natal...	132,000	10,000	– 122,000
Australia	1,315,000	15,000	–1,300,000
New Zealand	141,000	21,000	– 120,000

Yen = 2s. 0½d. (normally).

Indian Trade.—H.M. Senior Trade Commissioner in India (Mr. T. M. Ainscough, O.B.E.) reports that the trade returns of British India for the month of August, 1922, published by the Department of Statistics, showed an increase in the values of both imports and exports as compared with the preceding month and the corresponding month of last year. There were, however, large decreases in the imports of machinery (Rs.94 lakhs), railway plant and rolling stock (Rs.67 lakhs), and electrical instruments (Rs.16 lakhs).

THE NORTH-EAST MIDLANDS ELECTRICITY DISTRICT.

ELECTRICITY COMMISSIONERS' INQUIRY.

At the Town Hall, Sheffield, on October 17th, Sir John Snell (chairman), Sir Harry Haward (vice-chairman), Messrs. H. Booth and A. Page, accompanied by Mr. E. W. Hudson (solicitor), and Mr. D. S. Cumberlege, sat as an Electricity Commission to inquire into a scheme submitted by the Sheffield Corporation for the constitution of a Joint Electricity Authority for the North-East Midlands area.

Mr. W. E. HART, town clerk, in presenting the case on behalf of the Sheffield Corporation, said that the Sheffield scheme* was the only one which had been submitted in response to the invitation of the Commissioners, and it had the support of the Rotherham Corporation, and in some measure that of the Chesterfield Corporation. From small beginnings they had built up a large and prosperous undertaking on which they had spent nearly four million pounds; in Sheffield they sold 103 million kWh per annum. The average total cost of electricity produced was 1.726d. per kWh, and the average price obtained was 1.75d.

They started with the advantage that the Commissioners had issued a Provisional Order determining the area,† but he hoped that the exclusion of Wath-on-Dearne was not final. The area covered by the scheme was about 1,030,000 acres, and the population about 1,320,000. Having regard to the size of the area, its population, and the intensity of its industry, it was a reasonable and suitable area; he believed it would lend itself to efficiency and economy. They submitted that the onus of any body asking for exclusion was to justify its case. There would be an important question as to the exclusion of the North-East Lincolnshire district.

The Town Clerk sketched the working of the scheme and said it was proposed to link up the Blackburn Meadows station with Rotherham, and from Rotherham or Blackburn Meadows there would be a line to Kiveton Park, Worksop, and Manton; for further supplies they would have to increase their plant at Blackburn Meadows. The second station would be at Sprotborough, near Doncaster, and from that station they would carry transmission lines to Doncaster. The third line would be through Kiveton Park, Barlboro, and on to Chesterfield.

Dealing with various objections, the Town Clerk said the West Riding County Council had sent in an objection stating the view that the time was not opportune owing to the financial condition of the country, and later it sent in a further objection that no scheme would be acceptable to it unless it made suitable provision for extending the supply throughout the district to all local authorities which had power to demand a bulk supply. While that was quite right as a matter of principle it was not a question that needed to be considered at the moment, because a supply was wanted, and the whole question was: Could it be included on terms that could be afforded? They were there to constitute an authority and not to discharge duties. The acquisition of existing undertakings would have to be carefully considered later.

A curious document had come from the Nottinghamshire County Council, he went on. All he could say with regard to it was that the person who compiled it did not appear to have read the Act of Parliament. The objection was that there was no provision in the scheme that existing stations should not be included in the scheme, and the Notts County Council also wanted to know what was going to happen in a few years. He submitted that that was not the question before the inquiry, which had only to consider whether an authority should be constituted.

The Town Clerk detailed other minor objections from local authorities and private interests, and concluded by pointing out that no alternative scheme had been offered.

ALDERMAN R. STYRING, chairman of the Parliamentary Committee of the Sheffield Corporation, traced the growth of the Department. He knew the iron fields in the North Lincolnshire area were supplying themselves, and would be able to do so for a considerable time, but he pointed out that eventually a large station on the Trent, which would be the natural source and centre, would be established. He thought Sheffield and Rotherham should have fifty per cent. of the representation on the authority when it was set up.

In cross-examination, Ald. Styring said the reason why the Notts & Derby Power Co. had not been invited to conferences on the question of forming the authority was that the company had had possession of part of the district for a considerable time and had done nothing in it. He thought the district would be better served by the authority than by the company. With regard to finance, the scheme would have to stand on its own bottom. He did not suggest that generating stations owned by the colliery companies should be scrapped; they might be used by the authority.

THE CHAIRMAN pointed out that months had passed during which the company could have prepared its own proposals and commented on the fact that Sheffield was the only place that had the public spirit to submit a scheme to the Commissioners.

The inquiry was adjourned until October 18th, when Mr. F. PARKER RHODES, chairman of the Dalton Main Collieries, Ltd., gave evidence on behalf of the South Yorkshire Coalowners' Association. He said he looked with very great apprehension on any scheme which was likely in any way to increase the burden of the rates. For that reason the members of his Association were opposed to the exploitation of the district, to any further extent, by municipal effort. They were doubtful of the basis upon which the scheme was founded, but they did not wish to take up an attitude of sheer obstruction. There were probably many advantages in the idea of linking up the existing power stations controlled by the municipalities, but it did not seem to members of his Association that, in order to bring that about, a scheme such as the present one was necessary. It was very desirable, in the best interests of the district, that the existing Yorkshire Power Co. should be, as far as possible, allowed to develop its undertaking.

In cross-examination by the Town Clerk of Sheffield, Mr. RHODES said he and those associated with him thought the time was not opportune to go to the expense of linking up existing stations, because they could not look far enough ahead into the future; also that municipalities were not the best people to conduct businesses of that kind. Something could be done to improve the present position, but this was not the time to do it. He characterised the scheme as a rather bold project to be put in hand at the present time, as they did not know what it was going to cost. "If you make a mistake," he continued, "you come back upon the rates, and that is what I object to. Municipalities should not be entrusted with business of this kind. I want somebody who makes a living out of industry to look after it."

Pressed by the Town Clerk as to the reason for his fears that there would be losses on the rates, he said he had to fall back upon his own unfortunate experience with regard to Rotherham's municipal enterprises—electricity, waterworks, and sewage schemes. The only advantage of linking up a station to a colliery would be that it would be a stand-by.

In reply to Sir Harry Haward, Mr. RHODES said that what he had stated represented the views of the South Yorkshire coal owners. He would not like to commit himself to saying that it represented the views of owners outside that area because he was not intimate with their conditions. It might be very likely that the Cannock Chase colliery supported a scheme such as the one under consideration and asked for representation. Every colliery had to be taken on its merits; if he were the owner of a non-coking colliery, undoubtedly he would take advantage of it.

Mr. A. PAGE: You would not object if you had private enterprise represented on the Joint Authority?

Mr. RHODES: If private enterprise is made responsible for the development then we have no objection, because we know private enterprise will not go faster than it ought to do, and will count the cost first.

Asked for his opinion on the subject of the possible development of electricity in mines, Mr. Rhodes said he was not an electrical expert, and there was a difference amongst mining men with regard to the use of electricity in collieries. There were undoubted objections to the increased use of electricity underground. In the view of some engineers the objections were small; in the view of others, with whom he agreed, they were very great. The use of electricity on the surface generally depended upon local circumstances and the plant. Broadly, it might be taken as an admission from him that for subsidiary purposes—apart from the main operation of winding—the use of electricity was advantageous and economical.

THE CHAIRMAN: You use electricity in the mines in some cases?—Yes, for the pump and the fan.

Have any of your mines adopted electrical winding?—I don't know.

You know at least that one mine in this district is electrically wound?—I hope it will be borne out by results.

Is it inherent conservatism on your part that you have not adopted electricity fully in the mines?—Oh, no, we are not at all conservative; we adopt new methods if we think we are going to improve things, but we are not radicals.

Your view is that electricity will not be of use generally in this coal field?—I would not say that, but up to the present steam has been generally used. It may be that in the future electricity will be generally used.

Is it wise that those responsible for the industrial development of the country should sit down and do nothing?—I would leave it to the Power Co. in the district, and let it develop all it can.

That is not an answer. Having regard to the contingency of a bigger electrical area, is it wise to make a survey of the requirements of the area?—I don't quarrel with that.

Would not the logical conclusion of your attitude be that there would be no progress at all?—Not at all.

Mr. WALTER BENTON JONES, chairman of the South Yorkshire Coal Trades Association, agreed with Mr. Parker Rhodes' evidence, and said coalowners viewed with very great alarm the possibility of an electrical scheme being put into operation which was largely controlled by public bodies. In his view no such scheme as that proposed was necessary.

SIR HARRY HAWARD pointed out that the scheme did not enable the authorities to put any charges on the rates other than the existing ones.

* ELEC. REV., July 15th, 1921; p. 103.
† ELEC. REV., October 1st, 1920: p. 434.

Mr. Jacques Abaday, on behalf of the Sheffield & Rotherham Manufacturers' Association, said they were not opposed to setting up a Joint Authority, but would support it, subject to safeguards and modifications. He contended that both Sheffield and Rotherham had more plant than they required at present, and asked that they should not buy more.

The Town Clerk of Sheffield said he would undertake that no further capital expenditure for plant should take place for five years without special application to the Commissioners and the Association Mr. Abaday represented.

On October 19th evidence was given by Mr. Charles P. Markham, of Chesterfield, chairman of the Staveley Coal and Iron Co., who represented the Derbyshire & Notts Coalowners' Association, which had a tonnage of 21 millions, coal and iron, per annum. He gave an account of the present electrical equipment of the collieries in the Doncaster area with which he is connected, and said the capacity was 9,000 kW. There was also 7,000 kW installed at the Parkgate Ironworks, which were on the same ring. They were about to supply the Great Northern Railway Co. with 3,000 kW, and were supplying the Doncaster Corporation and the village of Carcroft, and generally where people wanted electricity. Electricity was produced at an extremely cheap rate because, with the exception of Parkgate, it was all derived from exhaust steam turbines. The Staveley electrical line was from 38 to 40 miles long. At the Staveley works there was 9,000 kW, and the whole of the steam was derived from waste gases from the coke ovens and furnaces. In the works and collieries under his control in Derbyshire there was some 12,500 kW installed, 150 transformers, and a very considerable length of pipe line. They were supplying from Staveley about a quarter of what Sheffield was turning out. He had been anxious to extend the use of electricity. Various little companies had been started, and they had got the workmen to take shares in them. One of them was at Birmingham, another at Staveley. They were supplying Chesterfield Corporation with about a million kWh per year at 0.4d. They charged the little companies 1d. for high-pressure energy.

Sir John Snell said he had not been aware that electrical development in the Staveley district had gone so far.

Mr. Markham said the groups had rejected a scheme for a super power station. They preferred smaller units. He objected to the proposed new authority, on the grounds of its composition and its size, and suggested that there should be only six members—two from the Corporations, two from the iron and coal masters, and two from the consumers, with an independent chairman, possibly paid. An authority of 24 members would be unworkable. Corporation bodies were always changing, and there was no continuity of policy. They would be very much distressed, as manufacturers, if they were to be handed over to Corporations which admittedly could not produce as cheaply as they could produce themselves.

In cross-examination by the Town Clerk of Sheffield, Mr. Markham said that if the consumers' objections to representation were removed, they would still want to know what the big power stations (like Rotherham and Sheffield) were going to do. As manufacturers they looked with amazement on the antics of Rotherham and Sheffield, either of which huge stations would drive the whole district. He spoke of the Rotherham station as a huge white elephant, without even enough water for the turbines. There were private concerns possessing their own plant, and generating at less cost than the Sheffield Corporation could, and they did not like the idea of having to buy electricity from the Corporation at a very heavy price.

The Chairman: Are you not under a misconception Nobody is going to compel you to buy from this authority.

Mr. Markhamh We have been given to understand that we are bound to take electricity from the super power stations.

The Chairman said that was a misconception of the scheme, and Mr. Markham said in that case his objection fell to the ground.

The duplication of lines was then discussed, and witness said his groups would be willing to work with the Authority to avoid this.

Mr. Booth: So long as it is established that it won't, of necessity, interfere with you in any way, have you any objection to the Joint Authority?

Mr. Markham: No. In reply to the chairman, Mr. Markham added that he agreed with the principle of inter-connection.

Sir Henry Haward recalled Ald. Styring, and put to him a suggestion that, instead of Chesterfield having two representatives on the Authority, Doncaster two, and Worksop one, these three authorities, together with Mexborough, should have three representatives, thus leaving two places for manufacturers, colliery owners, railway companies, and others.

Ald. Styring thought this was an admirable suggestion.

Mr. W. M. Selvey, electrical engineer, gave technical evidence in support of the scheme, and described the proposed developments during the two periods of five years each. Among the possibilities which had been taken into account was the electrification of the railways, and provision had been made for the supply of 40,000 kW for that purpose in the second period of development. The scheme would be satisfactory.

The Town Clerk of Sheffield: It restricts the expenditure on capital as much as possible?

Mr. Selvey: That is so.

And you think that any other method than the one suggested would not be so effective?—That is so. This method will give an adequate supply at low running costs.

In cross-examination by Mr. Harker, the witness said that they estimated they would sell 401,000,000 kWh at the end of the first period of five years, of which about 264,500,000 kWh would be taken by Sheffield and district; Rotherham would take 86,000,000 kWh, Chesterfield 21,000,000, Doncaster 18,000,000, Mexborough 8,000,000, and Worksop 3,000,000. Of the 14,000,000 kWh that it was estimated would be sold in the Chesterfield "outside" area, Mr. Selvey thought about two-thirds would be supplied to collieries. He knew that collieries were making their own electricity before he heard Mr. Markham's evidence.

The estimated "individual development" coal consumption for the first period would be 391,000 tons compared with 355,000 tons under the scheme. This would mean a saving of 36,000 tons per annum. Questioned as to how this estimated consumption was arrived at, Mr. Selvey replied that the explanation would occupy a long time. He had had the full assistance of the most expert engineers in that area.

On October 20th Mr. H. F. Bidder continued the cross-examination of Mr. W. W. Selvey, who stated that, despite the fact that there was a large amount of spare energy in the form of waste heat and gases in the area, which would obviously be larger when the hoped-for revival of trade came, he had serious hopes of selling electricity in that district.

Answering Mr. W. P. Donald, the witness said that a striking feature of the times was the increasing number of new uses of electricity. The firms in Sheffield which supplied their own electricity were diminishing in number. There was every reasonable hope and belief that it would be possible to sell at the average price of 0.7d. under the scheme.

Mr. Selvey was re-examined by the Town Clerk of Rotherham with regard to the suggestion that one purpose of the scheme was to get rid of the Rotherham undertaking's surplus power. Mr. Selvey accepted that the minimum load in Rotherham that week had reached 20,000 kilowatts.

Mr. des Forges: With a maximum demand of 20,000 kilowatts you are getting towards the point where there is not the enormous surplus that the opposition seems to think there is likely to be?

Mr. Selvey: If anybody is coming after this surplus they had better hurry up. He went on to say that in view of the possibility, and almost certainty, that within a reasonable period there would be electrification of railway traction in this district, the railway load allowed for in the scheme was reasonable.

The Chairman pointed out that the cost of constructing the generating station at Sprotborough was estimated to be £15.9 per kilowatt. Before the war the cost would have been about £9. On what basis was that figure arrived at?

Mr. Selvey replied that the figures were frequently revised to keep pace with the advancing cost. It was his view that the basis of £15.9 per kilowatt would be likely to go down in the course of the next five years, which would mean that the estimates would be so much improved. Mr. Selvey emphasised that this was one of the best coalfields in England, with the best coal, the best pits, and the best area for development. It was likely to increase very much in the sense of the greater use of power in the production of coal.

The witness was asked to give his candid opinion as to the best delimitation of the district. Mr. Selvey agreed with the whole of the scheme except that he would not raise any objection to the exclusion of the Buxton area. The Worksop area would develop into a dense colliery district. East Retford should be included in the scheme as it could not get a supply from any other source. Gainsborough was a little remote at present, but in the end it would require and get a supply. A very great extension of industry would be seen at Scunthorpe, where the tendency was more and more to make the finished product instead of, as in the past, merely making the raw material of pig iron. He agreed with the suggestion of the Chairman that if the colliery companies combined with this scheme it would involve no increased cost to the collieries, a possible benefit to them from the sale of surplus energy, and additional safety during industrial trouble.

The Chairman: Looking at it from a purely engineering and economical point of view, is it your opinion that all these undertakings, both public and private, will in the course of time be interconnected so as to bring about the greatest benefit for all, as well as the greatest benefit to the individual in question?

Mr. Selvey: That is most emphatically my view.

This concluded the case for Sheffield, and Mr. des Forges, Town Clerk of Rotherham, then went into the witness-box on behalf of the Corporation. Having got its Order in 1898, he said, and the power station having been opened in 1901, the area developed electrically probably as rapidly as any other part of the country. In 1901-02, when the station was opened, the total number of kWh sold was about 87,000. Ten years later it had risen to 2,900,000. Then they got what they looked upon as the boom period of 1917-18, when they sold 21¼ million kWh. During the slump period last year the sales fell to 18,000,000 kWh, but now they were returning again

to the more prosperous periods. They anticipated that this year they would exceed the sale of 40,000,000 kWh.

On October 21st Sir John Snell pointed out that the promoters had not put forward a definite proposal as to the terms on which they proposed to retain existing generating stations as part of the scheme. The Commissioners were, therefore, unable to say whether the resulting cost of electricity under the scheme would be greater or less than at present. He asked the promoters to give serious consideration to this matter.

Mr. Bidder, addressing the Commissioners on behalf of the L. & N.W. and the Midland Railway Companies, said their attitude towards the scheme was neither one of opposition nor of support. They were perfectly satisfied to leave the interests of electricity supply in the hands of the Commissioners, certain that the scheme which was ultimately sanctioned would meet their needs. It was certain that these railways would be electrified, and it was in view of a coming, but not in any sense an immediate, event that they asked for protection. The railway conditions in this area were very special; a combination which electrification would most benefit. Economical working could only be secured if a considerable area of railway was worked from the same source of supply. The railway companies asked the Commissioners to say that the amount of electricity which they would be entitled to take should be so defined as to include a supply that would take them to a reasonable distance from the source of supply, and the railway companies had agreed with the promoters upon a clause which they asked should be included in the final form of the scheme. With regard to the important question of the railway companies' right to demand a supply of electricity, the scheme conferred no such right at all.

Sir John Snell said the Commissioners' model clause, which would be inserted in the scheme, contained a definite requirement that the Joint Authority should supply a railway company on terms.

Dr. H. B. Fletcher strongly supported the scheme on behalf of the Dronfield Urban District Council, and complained of the neglect of the Derby and Notts. Electric Power Co., which had had the sole right to supply electricity in the district for the last 20 years. He said this neglect had hindered the development of the district. When Dronfield supported the Bill of the Derby & Notts. Co. in 1901, it was given to understand that the company would at once proceed with the erection of a generating station at Sheepbridge, but up to the present the only station it had supplying energy was at least 30 miles away, and consequently of no use to the Dronfield district. Anyone requiring electricity had to install the necessary plant and make it for himself, which six firms had already done, besides other private house lighting plant.

Mr. Farmer, on behalf of the West Riding County Council, said that body had passed a resolution expressing the opinion that the acquisition of electrical undertakings in the West Riding was economically impracticable at present. The County Council also urged that for the moment the Joint Electricity Authority should be considered an advisory or supervisory body, to make the best use of existing undertakings by linking-up and the extension, as far as was economically practicable, of generating and distributing plant. He was aware that this went to the root of the whole matter. It had been represented to the Commissioners that unless they set up such a body as the promoters proposed they could do nothing, but he suggested that this was not the case. There was no need to stagnate. The provisions of Section 4 of the Act of 1919 had been vitally affected by an amendment in the Act of 1922. The view of the County Council was that if people availed themselves of the section referred to, a great deal could be done by linking-up and that there was no necessity to set up a Joint Electricity Authority. The County Council also attached the greatest importance to direct representation on the Authority.

Mr. Skinner, for the Derbyshire County Council, also argued in favour of direct representation. The suggestion that the Derby & Notts. Power Co. should be excluded was a serious matter from the point of view of the District Councils in the south of the district, especially Matlock and Blackwell, because their potential source of supply at the moment must be the Power Co.

Mr. Featherstone, on behalf of the Worksop Urban District Council, gave general support to the scheme, but spoke strongly against the suggestion that Worksop should be deprived of direct representation.

The inquiry was then adjourned indefinitely.

Sir. John Snell suggested that during the adjournment the promoters should seriously consider the questions of representation which had been raised, and he also expressed the hope that some of the outstanding difficulties between the power companies and the promoters might be removed or improved before the resumption of the inquiry.

When Did It Happen?—We notice that the U.S. Department of Commerce is warning American manufacturers and exporters *not to overpay the postage on their foreign letters.* Well—well—

THE RADIO TELEPHONE BROADCASTING SCHEME.

Manufacturers' Proposals.

To define the present position regarding the scheme for broadcasting by wireless telephony, a fifth meeting of manufacturers was held on October 18th at the Institution of Electrical Engineers, over which Sir William Noble, formerly chief engineer to the General Post Office and now of the G.E.C., presided. Sir William explained the present position of the Postmaster-General and the company as one of complete agreement. On May 18th there was a meeting at the General Post Office of persons and firms concerned. Twenty-three firms were represented, and it was obvious that 23 could not build stations, so they had finally agreed to form one company—the British Broadcasting Co. This would be "a public utility service for the broadcasting of news, information, concerts, lectures, educational matter, speeches, weather reports, and theatrical entertainments"; it would have a capital of £100,000 in £1 shares, guaranteed by the British Thomson-Houston Co., Ltd.; General Electric Co., Ltd.; Marconi's Wireless Telegraph Co., Ltd.; Metropolitan-Vickers Electrical Co., Ltd.; Radio Communication Co., Ltd.; and the Western Electric Co., Ltd.; which would be immediately responsible for £60,000 if necessary.

The directorate would consist of eight directors and a chairman. One director would be appointed by each of the six companies named and two by the other members of the company. These two directors would retire annually, but would be eligible for re-election. The chairman would be some well-known public man not connected with any of the constituting companies, and the company had secured the services of Lord Gainford, late P.M.G. These were the principal points in the Articles of Association.

The main provisions of the agreement were: Any *bona-fide* British manufacturer of wireless apparatus could join the company by taking one or more shares, and on signing the agreement the member would pay £50 (to show good faith). The money so received would not be used by the company, but put to a separate account and returned to a member should he leave the company. Every member must undertake that the apparatus he sold, except batteries, accumulators, and aerial equipment, was made in this country. He must engrave or otherwise mark the apparatus he sold, so that its origin was known. The royalty payable to the B. B. Co. would be:—

Description of Apparatus	Sum or Royalty payable.
On each crystal set	£0 7 6
On each microphonic amplifier without using valves	0 7 6
On each crystal set and one valve	1 7 6
On each crystal set and two valves	2 2 6
On one valve set	1 0 0
On each two-valve set	1 15 0
On each three-valve set	2 5 0
On each four-valve set	2 15 0
On each other set a royalty *pro rata* to the above	
On each telephone ear-piece	0 0 3
On each loud speaker with or without trumpets	0 3 0
On each valve	0 0 2

Broadcasting apparatus must not be made for any person not a member of the company, and under the conditions laid down for the sets to be approved by the P.M.G., only members of the company could have sets approved, which would be sealed and returned to the member, who would retain the sealed approved set for reference when necessary. Each set would be stamped with the approved mark "Type approved by P.M.G., B.B.C.," and a copy of the mark would be supplied to each member of the company.

For transmission purposes every member who had any inventions must give free use of them to the B.B.C.—*i.e.*, all patents would be pooled, so that the B.B.C. would be free of all royalties—that was one of the advantages of one broadcasting company.

By the licence the P.M.G. guaranteed the B.B. Co. that no foreign-made sets would be allowed to be sold for broadcasting purposes.

The Postmaster-General could not protect the company for a longer period than two years. That was to say, there would be no foreign competition for two years. The company, in consequence, would not guarantee the service for more than two years. Before that period expired, however, there would be a further conference. There had been a considerable concession with regard to wave length. The limitation of 500 metres had been abolished and there was now no limit. This would mean that anyone with a broadcasting set would not only be able to receive efficiently the broadcasting programmes, but would be able to tune in for any outside station.

It was confidently hoped that this would mean a considerable addition to the numbers applying for licences, so that the income of the B.B. Co. would enable it to provide really high-grade programmes. The Broadcasting Committee was fully alive to the necessity of having good programmes, and it was only by doing so that the success of the scheme would be assured.

Also, it was negotiating with the P.M.G. to get

authority to raise the power of the broadcasting stations from 1½ to 3 kW. As a temporary measure at least, Marconi House would be utilised as a broadcasting station for London, and it was possible that there would be at an early date a temporary station at Manchester.

The licence to be issued by the P.M.G. for broadcasting would cost 10s.; 5s. would go to the Post Office and 5s. to the B.B. Co. The licence would apply only to apparatus with the approved mark of the P.M.G.

A general discussion followed and some doubt was expressed on whether the public could be protected against illicit sets. According to the *Financier*, the company is limited to a maximum dividend of 7½ per cent.

Sir William said that sets which had already been sold could not be dealt with, but if they did not comply with the Postmaster-General's regulations the owners could not get a broadcasting licence. If traders had already in stock goods bought before July 15th from abroad, and satisfied the Postmaster-General on that point, they would be allowed to sell them.

Asked whether one who obtained parts from abroad, assembled them in this country, and sold them as British-made was a *bona-fide* manufacturer, Sir William said it was intended that everything should be made in this country with the exceptions he had mentioned. Raw material could be imported, of course, as it could not be obtained in this country.

Mr. Godfrey Isaacs, of the Marconi Co., explained that the Broadcasting Co. was not to make profits. If 100,000 firms wanted to become members of the company, by the articles of association those which had more than one share would have to release them in order to admit the others. So that it was possible to have 100,000 shareholders holding one share each.

Mr. Phillips, a manufacturer's representative, explained in detail the safeguards the Postmaster-General had insisted on in order to ensure equality for all manufacturers, large and small.

A resolution empowering the committee to proceed with the registration of the Broadcasting Co. was carried unanimously.

The committee of the Radio Association, at a meeting held on October 18th to consider the proceedings of the British Broadcasting Co's. meeting, issued the following statement:—

"The Radio Association deplores the fact that thousands of licence-holders were entirely ignored in settling the form which broadcasting is to take, and that the general public is receiving no adequate protection against the growth of a monopoly.

"Those present at the meeting were afforded no opportunity of seeing the articles of association of the company, although they gave practically unlimited powers to a small group.

"A deposit of £50 is to be demanded from small manufacturers who subscribe for a £1 share. What is the purpose of this deposit, and to whom does it go."

"The royalties are altogether too excessive, and bid fair to cripple an important British industry.

"The Radio Association looks to the Postmaster-General to give an early explanation of these measures."

THE SOUTH-WEST MIDLANDS ELECTRICITY DISTRICT.

Establishment of Advisory Joint Committee.

It will be recalled that, in accordance with the provisions of the Electricity (Supply) Act, 1919, the Electricity Commission provisionally delimited the above-named district in October, 1920; in August, 1921, the Birmingham Corporation and the Shropshire, Worcestershire & Staffordshire Electric Power Co. submitted a joint scheme for the re-organisation of the existing supply of electricity within the area, and the Commissioners held their first inquiry in connection with the matter in November of the same year. The decisions come to by them as a result of that inquiry were announced in March, 1922, and in the following July the Electricity Commissioners held their second local inquiry.

The matter has now been carried a step further by the issue of the Electricity Commissioners' South-West Midlands Electricity District Order, 1922, constituting the district and establishing the South-West Midlands Advisory Joint Committee (appointed by the Birmingham Corporation and the Shropshire, &c., Co.).

The Order, which has been submitted to the Minister of Transport for confirmation, and will come into operation as soon as it has been approved by a resolution passed in each House of Parliament, is a brief one. The scheme constituting the district and establishing the Committee is set out in a schedule, while the first annex contains the main outlines of the technical scheme. The second annex gives the agreements that have been come to between the Birmingham Corporation, the Leicestershire & Warwickshire Electric Power Co., and the Shropshire, Worcestershire & Staffordshire Electric Power Co. The third annex contains additional provisions as to the generation and transmission of electricity.

THE INSTITUTION OF ELECTRICAL ENGINEERS.

North-Eastern Centre Chairman's Address.

The opening meeting of the 1922-23 session of the North-Eastern Centre was held at Newcastle-on-Tyne, on October 23rd, when Mr. F. G. C. Baldwin delivered his inaugural address. At the last annual meeting Mr. Fawssett was elected chairman, but, acting upon medical advice, he declined the position, and Mr. Baldwin, who had been elected one of the vice-chairmen, undertook to fill the vacancy.

Mr. Baldwin took as his subject "The Progress and Potentialities of the Telephone in the United Kingdom," and opened with an interesting historical *résumé*.

In the United States at present there was one telephone to approximately eight of the population of 105,000,000. The development in the United Kingdom, with a population of 47,000,000, had never attained to more than one telephone station to 49 of the population. Telephone development in this country would depend primarily upon a return of commercial prosperity, and also on a better appreciation on the part of the public of the facilities afforded by a liberal provision of telephones.

Rapid development soon created, at the larger exchanges, serious difficulties in switching, which were eventually surmounted by the invention of the "multiple." It is not generally known that, although the multiple was invented and eventually perfected in America, it was devised independently in this country (much about the same time) by Mr. F. B. O. Hawes, of the United Telephone Co. Unfortunately he did not benefit by his invention, being forestalled by the patenting of the American product in this country.

It had been left for the British Post Office to conduct the first experiments in automatic switching in this country. The experiments were commenced in 1912, and the first automatic exchange was opened by the British P.O. in May, 1912, at Epsom. Since then 17 such exchanges had been placed in commission, their capacities ranging from 75 to 9,600 lines. The equipment for 9 of them was of the Automatic Telephone Co.'s type; for four of the Siemens type (two village); for two of the Western Electric Co.'s rotary type; one was of the Lorimer type, and one of the "Relay" pattern. Four exchanges were on order for Dundee (North Electric, 3,500 lines), Marton, Yorks. (Automatic Telephone Manufacturing Co., 80 lines); Southampton and Swansea (Siemens, 3,500 lines).

The questions whether automatic apparatus would satisfactorily fulfil the necessary switching functions; whether the British climate would affect prejudicially the operation of machine switching; and whether the British public would receive the automatic system favourably had been answered in favour of the automatic system. Hitherto the policy adopted by the Post Office had been confined to the application of automatic working to individual exchanges, and in no case had a self-contained area been dealt with. Plans were now, however, in hand for the establishment of automatic working in a number of multi-exchange areas, wherein the whole of the local traffic between exchanges situate therein would be dealt with exclusively by machine switching. There were possibilities of effecting large savings by the establishment of machine switching and the adoption of automatic working on a large scale in certain multi-exchange areas might be expected in the near future.

The Chairman then referred to long-distance telephony and concluded with an interesting reference to radio-telephony.

Prospecting by Electricity.—In a recent issue of *Le Génie Civil*, J. Michaut reviews the various methods of ore prospecting by electrical and other means. He refers, *inter alia*, to the application of Hertzian waves tried by Loewy (Austrian) and Lembach (German). The first method tried was not very satisfactory, as, in order to obtain accurate results, very short wave lengths are necessary, and the waves have to be capable of orientation. Further, the receiving set should be portable. The other method, due to the same authors, seems more easy of application. It is based on the variation in capacity of a transmitting aerial with the dielectric constant of the surrounding medium. This increased capacity is converted into an increase in the wave-length transmitted, this increase being easily measurable by wavemeters. Considerable space is devoted, with illustrations, to Schlumberger's method, based on the electrical conductivity of the earth. Conductivity is of two types: (1) metallic conductivity peculiar to the metals and certain minerals (pyrites, mispickel, pyrolusite, magnetite), the current being transmitted through these substances without any transport of matter or chemical reaction. (2) Electrolytic conductivity (water containing salts in solution), as a result of which electricity is propagated through these liquids, giving rise to chemical reactions by the dissociaton of the salts in solution into positive and negative ions. The method of sending the current into the ground and measuring the results, &c., are described. It would appear that the latter method is the one most promising in results. Apparatus have already been constructed for applying this method.

NEW ELECTRICAL DEVICES, FITTINGS, AND PLANT.

Readers are invited to submit particulars of new or improved devices and apparatus, which will be published if considered of sufficient interest.

A New Electric Fire.

A number of new and improved designs of electric fires for the coming winter have been put on the market by Messrs. Belling & Co., Derby Road Works, Montague Road, Upper Edmonton, N.18. Fig. 1 illustrates one of these which is of a novel shape and construction. The heating element is in two 1-kW bars. One of these is controlled by a separate switch, while the other is operated by a two-way switch

Fig. 1.—The Belling "Duplex" Fire.

which also controls the element of a boiling ring fitted in the top of the appliance. The body of the fire is of oval shape, the top and bottom are made of cast iron while the main body is of sheet steel. The dimensions of the fire are:—Height 17 in., width 18 in., and depth 11 in.

The Ampliphone.

A writer in *Le Génie Civil*, for September 16th, describes a new type of loud-speaking receiver for wireless sets. The general arrangement of this is shown in the illustration, fig. 2. In the "ampliphone," as M. Quinet, the inventor, calls the new device, a small moving coil B, 25 mm. in diameter, is suspended from a corrugated membrane M. The coil has a fine wire winding connected to the primary *p* of a transformer T, the secondary *s* of which is connected to the ordinary amplifier of the receiving set. The coil B is free to oscillate inside the annular magnetic field NS, formed by a winding E on the centre core N of the magnet, and taking 1 ampere at 6 volts. The 2-mm. annular air gap

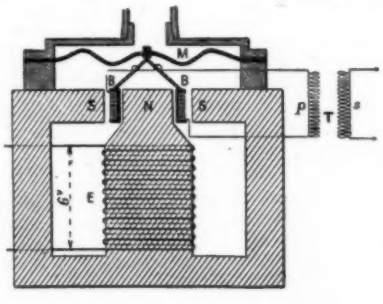


Fig. 2.—The Ampliphone (Section).

between N and S is sufficient to allow the coil to oscillate and vibrate the membrane M by the combined action of the magnetic field and the current received from the transformer.

The coil B, the casing of which is non-metallic, is stoutly fixed by a light non-magnetic cone to the centre of a German silver diaphragm 80 mm. in diameter, and 0.3 mm. thick. This diaphragm, which is corrugated, is securely fixed to the edges by screws. It is surmounted by a resonance box and a thick mouth-piece not shown in the figure.

Moorwood Fires.

A new line of electric fires has been placed on the market by Messrs. Moorwoods, Ltd., of Harleston Iron Works, Sheffield, in which is embodied a patent heating element, shown in fig. 3. This element consists of a base of white refractory material with shallow grooves separated from one another by a very thin web; the heating strip is not coiled but zig-zagged in one plane only, thus making a flat element which lies between the webs. It is claimed that the strip thus formed is so strong, even when hot, that it cannot sag or drop, and that touching of adjacent turns is quite impossible. When in use, owing to the thinness of the webs allowing the strip elements to lie close together, the appearance produced is that of a solid red-hot bar.

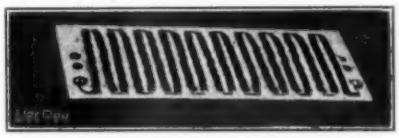


Fig. 3.—Moorwood Heating Element.

This element is standardised for all the Moorwood fires and cooking apparatus, and is so designed that the electrical connections are made in the act of mechanically fixing the element in place; this is a simple operation, being effected by means of a couple of wing nuts. Similarly the back cover of the fire is secured in place with wing nuts, and an element can thus be replaced without using any tool. Fig. 4 shows a two-bar fire, with two rotary switches; the elements when in place are slightly proud of the surrounding frame, so

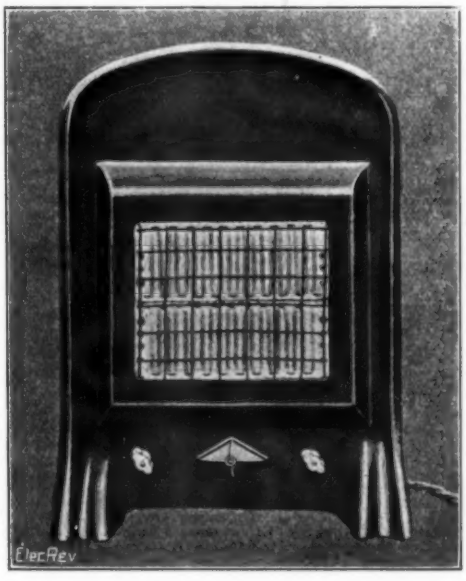


Fig. 4.—Moorwood Fire.

that the frame receives little heat, and the heat is radiated over a wide angle. The insulation is of mica, and all connections, &c., are concealed from view. The makers claim that the element is practically indestructible, and its construction enables the heating strip of a boiling plate, for instance, to be brought very close to the bottom of the utensil which is being heated. A heat-resisting handle is fixed on all Moorwood fires.

"Falco" Rustless Steel Fires.

"Falco" electric fires and heaters need no introduction, but amongst the 1922-23 season's designs, the Falkirk Iron Co., Ltd., of Falkirk, has produced something new in such devices. The appeal of the rustless steel electric fire should be irresistible for several reasons; indeed, it may truly claim to be a labour-saving appliance. Not only does the electrical equipment eliminate all dirt, dust, and smell, but the rustless steel body carries the matter a stage further and will keep clean without constant attention. Two patterns are at present available; the "Argyll" has a 2-in. frame with moulding mounting on the outer edge, flat splays to the fire and berry moulding round the edge, while the "Darnley" has a 2-in. O.G. frame with curved coves to the fire and hob moulding fitted on the edge. Both types are provided with a trivet hob, two switched, and five of the maker's standard bars (capacity: 3,750 watts), being otherwise of standard construction. The overall dimensions of the new fires are: height 24¼ in., width 18 in., depth 7½ in., and the weight is 35 lb. They are neat in appearance and should prove a great convenience.

NEW PATENTS APPLIED FOR, 1922.
(NOT YET PUBLISHED.)

Compiled expressly for this journal by Messrs. Sefton-Jones, O'Dell and Stephens, Patent Agents, 285, High Holborn, London, W.C. 1.

27,072. "Device for attachment of suspended insulator chains." A. Regaudin. October 6th. (France, October 8th, 1921.)
27,089. "Electric head lamps for motor-cars. &c." P. G. P. McCulloch and W. E. Marshall. October 6th.
27,090. "Electric head lamps for motor-cars, &c." P. G. P. McCulloch and W. E. Marshall. October 6th.
27,091. "Electric head lamps for motor-cars, &c." P. G. P. McCulloch and W. E. Marshall. October 6th.
27,094. "Distributors for magneto-electric machines." British Thomson-Houston Co., Ltd., H. W. H. Warren and A. P. Young. October 6th.
27,095. "Electric motors." British Thomson-Houston Co., Ltd. (General Electric Co.). October 6th.
27,096. "Control of electric switches." British Thomson-Houston Co., Ltd., and A. S. Fitzgerald. October 6th.
27,097. "Multiple-armature relay." F. Aldendorff. October 6th. (Germany, October 19th, 1921.)
27,106. "Leclanché batteries." E. E. Dutt and S. H. Godfrey. October 6th.
27,118. "Sky signs." J. M. Dickie. October 6th.
27,124. "Electrically-propelled vehicles." T. Foster. October 7th.
27,134. "Knobs, terminals, &c." A. Round and R. W. Seaby. October 7th.
27,144. "Head lamps for motor, &c., vehicles." C. B. Robinson and Robinson Bros., Ltd. October 7th.
27,158. "Electric switch." M. C. Richardson, Richardson & Whittaker, and J. E. Whittaker. October 7th.
27,169. "Dynamo-electric machines." Electro Dynamic Construction Co., Ltd., and N. Pensabene. October 7th.
27,171. "Alternating-current dynamo-electric machinery." Metropolitan-Vickers Electrical Co., Ltd., and G. M. Pestarini. October 7th.
27,172. "Electric switchgear." W. A. Coates and Metropolitan-Vickers Electrical Co., Ltd. October 7th.
27,180. "Apparatus for use with high-frequency circuits of telegraphic or telephonic systems." J. A. Coomes and J. A. Coomes & Co., Ltd. October 7th.
27,181. "Sound-amplifying instruments." J. A. Coomes & Co., Ltd., and J. A. Coomes. October 7th.
27,201. "Roofs, and lighting of same." British Thomson-Houston Co., Ltd. October 7th.
27,242. "Chain for suspending electric fittings." A. N. Haddow and A. P. Rutherford. October 9th.
27,245. "Sparking plugs." H. Martin. October 9th.
27,261. "Machinery for conversion of alternating into continuous current." E. E. Dutt. October 9th.
27,262. "Wireless apparatus." A. Stewart and A. Compare. October 9th.
27,268. "Valves for wireless telegraphy and telephony." A. Cairns. October 9th.
27,270. "Train control." A. L. Ruthven. October 9th.
27,280. "Electric lamps." A. S. Sleebush. October 9th.
27,294. "Electric winding devices for spring motors." Vox Maschinen Akt. Ges. October 9th. (Germany, January 16th.)
27,295. "Conductor rails for electric railways, &c." Siluminite Insulator Co., Ltd., and F. V. Wythes. October 9th.
27,300. "Electric switches." C. D. S. Cranko. October 9th.
27,323. "Automatic devices for opening and closing electric circuits." A. E. M. Van der Meesch. October 9th.
27,340. "Passenger cars." W. Voss. October 9th. (United States, October 8th, 1921.)
27,376. "Memorandum-recording attachments for telephones." A. P. Hennessy. October 10th.
27,380. "Amplifying device for sparking plugs." J. C. Blow and W. Holmes. October 10th.
27,411. "Wireless aerial tuning inductances." J. B. Bignamy. October 10th.
27,412. "Wireless one-unit telephony receiving sets and intervalve coupling." J. B. Bignamy. October 10th.
27,424. "Sparking plugs." G. H. Wilson. October 10th.
27,442. "Electric transformer oil boxes." Akt. Ges. Brown, Boveri et Cie. October 10th. (Switzerland, October 15th, 1921.)
27,449. "Speed-controlling mechanism for papermaking, &c., machines." British Thomson-Houston Co., Ltd. (General Electric Co.). October 10th.
27,464. "Arrangement for high-frequency telegraphy or telephony." Dr. E. F. Huth Ges. October 10th. (Germany, August 30th.)
27,490. "Crystal detectors for wireless apparatus." W. C. J. Schlie. October 11th.
27,496. "Wireless telephone apparatus." Dudley Timber and Saw Mills, Ltd., and C. Goodall. October 11th.
27,508. "Electric signalling apparatus." F. C. Tipping. October 11th.
27,530. "Magnetic separators." A. E. Davies and H. H. Thompson. October 11th.
27,544. "Electric current-operated controlling mechanism." L. B. Hewitt and Metropolitan Electric Tramways, Ltd. October 11th.
27,547. "Electric heating devices." A. Ryner. October 11th.
27,563. "Electric transmission of sound." S. G. Brown. October 11th.
27,564. "Means for reception and/or reproduction of vibrations." E. W. C. Russell. October 11th.
27,567. "Electric discharge tubes, &c." C. G. Eden and General Electric Co., Ltd. October 11th.
27,575. "Electric accumulators." J. A. Hill. October 11th.
27,592. "Manufacture of socket caps for electric lamps, &c." Naamlooze Vennootschap Philips' Gloeilampenfabriken. October 11th. (Holland, October 27th, 1921.)
27,593. "Electric depositing, welding, and cutting." G. Motte. October 11th. (Belgium, January 13th.)
27,595. "Induction motors." H. Ateliers Cuenod Soc. Anon. October 11th. (Switzerland, October 18th, 1921.)
27,612. "Electric light baths." W. M. Edwards. October 12th.
27,639. "Apparatus for notching or punching core plates for dynamo-electric machines. &c." F. O. Adams and Lancashire Dynamo and Motor Co., Ltd. October 12th.
27,663. "Shades and reflectors for electric lamps." G. McKenzie. October 12th.
27,665. "Coils, holder, formers, or containers for wireless telegraphy, &c." G. H. Moody. October 12th.
27,668. "Sparking plugs." M. S. Mason and Smithbrook Engineering Co., Ltd. October 12th.
27,670. "Wireless apparatus." E. Hoyle. October 12th.
27,678. "Slip fitting for electric conduit, &c., tubes." R. J. Murphy and C. L. Reed. October 12th.
27,681. "Control of trains." A. R. Angus. October 12th.
27,700. "Electric connection fittings." B. G. Stephens. October 12th. (New Zealand, October 18th, 1921.)
27,701. "Means for production or reproduction of sound, &c., vibrations." S. G. Brown. October 12th.
27,704. "Electric discharge tubes." General Electric Co., Ltd., J. W. Ryde. October 12th.
27,716. "Electric testing apparatus." S. Platt. October 12th.
27,719. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd. (Automatic Electric Co.). October 12th.
27,722. "Electric transmission or reproduction of sound." S. G. Brown. October 12th.
27,723. "Electron discharge devices." British Thomson-Houston Co., Ltd. October 12th. (United States, October 13th, 1921.)
27,726. "Magnetic separators." B. H. Bedell. October 12th.
27,737. "Electric vulcaniser." J. S. Bones and F. Ellenger. October 13th.
27,754. "Sparking plugs." C. Bichler, J. Hughes, and L. Marseille. October 13th. (France, October 15th, 1921.)
27,757. "Repairing broken trolley wires of tramways." J. W. Waddington. October 13th.
27,763. "Tramway loops and points." J. E. Heywood. October 13th.
27,766. "Electric bells." Cable Accessories Co., Ltd., P. W. Davies, and F. H. Reeves. October 13th.
27,804. "Instruments for reception of telephonic sounds." B. G. Steggles. October 13th.
27,822. "Sparking plugs." V. K. C. Logan and A. H. Seton. October 13th.
27,833. "Outdoor junction boxes for electric circuits." Johnson and Phillips, Ltd., and W. J. P. Orton. October 13th.
27,837. "Electric fire-alarm systems." R. H. Carter and Siemens Bros. and Co. (Laidlaw partly). (E. A. Laidlaw). October 13th.
27,850. "Electric installations." H. Crochat Etablissements. October 13.h. (Belgium, October 14th, 1921.)
27,858. "Dynamo-electric machines." Metropolitan-Vickers Electrical Co., Ltd., and G. M. Pestarini. October 13th.
27,866. "Rheostats." H. Saville and C. H. Thornton. October 14th.
27,867. "Variable electric condensers." H. Saville and C. H. Thornton. October 14th.
27,868. "Systems of generation of alternating currents." E. Y. Robinson. October 14th.
27,877. "Variable resistance devices." H. P. T. Lefroy. October 13th.
27,886. "Sparking plugs." H. G. Longhurst and A. H. Seton, Sphinx Manufacturing Co., Ltd. October 14th.
27,889. "Wireless apparatus." A. S. Gosling. October 14th.
27,892. "Commutators, &c." A. Leigh. October 14th.
27,894. "Magneto electric machines." R. Bosch Akt. Ges. October 14th. (Germany, November 11th, 1921.)
27,914. "Electricity meters." R. Amberton and R. H. Barbour. October 14th.

PUBLISHED SPECIFICATIONS.

The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1921.

9,193. "Electric motors." R. Minucus. March 24th, 1921. (186,302.)
14,311. "Visual signalling apparatus for use in connection with colliery and like winding." E. Midgeley and R. A. Hopkinson. May 23rd, 1921. (186,373.)
14,331. "Electro-magnetic clocks." M. P. Favre-Bulle. May 23rd, 1921. (Convention date not granted.) (163,694.)
14,659. "Electric heaters." C. H. W. Morrison and M. & P. Enterprises, Ltd. May 26th, 1921. (186,383.)
14,872. "Telephone call distributing systems." Western Electric Co. and G. Deakin. May 28th, 1921. (186,388.)
15,028. "Electrical controlling devices for electric motors." M. Walker. May 31st, 1921. (186,389.)
16,624. "Dynamo-electric machines for motor-cycles and the like." S. L. Price. June 16th, 1921. (186,391.)
17,115. "Inductances for loading telephone circuits." Felten and Guilleaume Carlswerk Akt. Ges. June 25th, 1920. (Addition to 157,316.) (165,403.)
17,300. "Electric switches." J. B. Tucker. June 24th, 1921. (186,408.)
17,526. "Influence electrical machines." L. Vogel. July 2nd, 1920. (165,725.)
17,331. "Safety apparatus for the automatic disconnection of faulty electric circuit sections." M. Hochstadter. June 24th, 1921. (Patent of addition not granted.) (186,413.)
17,461. "Automatic electric cut-outs for dynamo-electric machines." J. B. Bignamy. June 27th, 1921. (Cognate application 24,356/21.) (186,418.)
17,518. "System for long-distance control of electric motors from one of a plurality of controlling stations." W. J. Mellersh-Jackson (Soc. des Etablissements Gaumont). June 27th, 1921. (186,420.)
17,859. "Oscillating-gear applicable for electric fans and other purposes." A. H. Railing and A. E. Angold. July 1st, 1921. (186,429.)
17,958. "Electro-magnetic and polarised relays." T. Lenaghan. July 1st, 1921. (186,433.)
18,358. "Distant control device for electric circuits." P. Nouvel. August 12th, 1920. (167,747.)
18,474. "Electrically-heated ovens." H. H. Berry. July 7th, 1921. (186,449.)
18,753. "Electrical measuring instruments." J. W. Record. July 12th, 1921. (186,454.)
19,375. "Self-aligning contacts for electrical apparatus." B. Raettig. July 18th, 1921. (186,465.)
19,394. "Means for introducing capacity effect in alternating electric current systems and apparatus." T. F. Wall. July 19th, 1921. (186,467.)
19,586. "Renewal of the filaments of thermionic valves for use in wireless telegraphy or the like." A. H. S. Colebrooke and W. A. Williams. July 21st, 1921. (186,469.)
19,660. "Electric drives for paper machines and the like." British Thomson-Houston Co., Ltd. (General Electric Co.). July 21st, 1921. (186,470.)
20,666. "Electric player for pianos and similar instruments." J. Lawler. August 3rd, 1921. (186,484.)
22,074. "Automatic trolley retrievers for electric tramcars." Chilian Electric Tramway & Light Co., Ltd. (A. Bowen). August 19th. 1921. (186,494.)
22,334. "Terminal block or switch for electric motors adapted for running on alternating or continuous current supply." W. C. Fairweather (Deihl Manufacturing Co.). August 23rd, 1921. (186,496.)
22,381. "Manufacture of Tungsten." General Electric Co., Ltd., and C. J. Smithalls. August 23rd, 1921. (186,497.)
22,583. "Electrodes, more particularly for electron-discharge devices." British Thomson-Houston Co., Ltd. (General Electric Co.). August 25th, 1921. (186,499.)
22,798. "Electric incandescent lamps." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 2nd, 1920. (168,598.)
23,953. "Protective devices for electric transformers." T. W. Ross and Metropolitan-Vickers Electrical Co., Ltd. September 8th, 1921. (186,514.)
26,098. "Automatic electricity meter." O. K. Heesch. August 27th, 1921. (186,354.)
27,678. "Electric switches and the like." G. Ellison. October 18th, 1921. (186,627.)
27,678. "Electric switches and the like." G. Ellison. October 18th, 1921. (186,527.)
30,158. "Electric cooking utensils." H. Graetz and F. Graetz. November 11th, 1921. (186,538.)
35,087. "Mercury-vapour lamps for curative light treatment." Ges. Quarzlampen. December 30th, 1920. (173,525.)

1922.

3,553. "Telephone call distribution system." Western Electric Co., Ltd., and G. Deakin. February 7th, 1922. (186,556.)
3,975. "Electric motor-control systems." British Thomson-Houston Co., Ltd. (General Electric Co.). February 10th, 1922. (186,557.)
16,973. "Motor-driven sewing machine." W. Fairweather (Singer Manufacturing Co.). September 2nd, 1921. (Divided application on 185,024.) (186,565.)